USER MANUAL

MOBA-matic II, CAN, A02
Levelling system for pavers, mills and other mobile applications

Please completely read this user manual and the contained safety instructions and note all given information before usage.

Keep available for further consideration!

ENGLISH

Translation of the original user manual 10-02-00818
Order-No.: 10-02-00819
Date: 12.2013
DV: 2.0

Please handle this manual confidentially. It is intended only for use by persons involved with the product.
The text and graphics of this manual have been elaborated with the greatest possible care. However, we may not be held liable for possible errors and failure effects.
Should you wish to make suggestions regarding the arrangement of this manual or point out possible errors, please contact your local dealer. We will gladly take up any of your ingenious ideas and suggestions.
Some company and label names are subject to label-, patent- or trade-mark protection.
All rights reserved. This document must not be duplicated or transferred for any purpose whatsoever without MOBA's written consent, irrespective of the way or the means that are used.

Copyright by
MOBA Mobile Automation AG
Kapellenstraße 15
65555 Limburg
Internet: www.moba.de

MOBA®
MOBILE AUTOMATION

Table of contents

Table of contents **3**
1 General information **6**
1.1 About this manual ... 6
1.2 Explanation of symbols ... 8
1.3 Limitation of liability ... 10
1.4 Copyright protection ... 10
1.5 Related documents ... 10
1.6 Spare parts ... 11
1.7 Final decommissioning / disablement ... 11
1.8 Disposal ... 12
1.9 Terms of guarantee ... 13
1.10 Customer service ... 13
2 Basic safety instructions **14**
2.1 Intended use ... 14
2.1.1 Conventional use ... 14
2.1.2 Inapproriate use ... 15
2.2 Limits of use ... 15
2.3 Alteration and rebuilding of the product ... 15
2.4 Contents of the user manual ... 16
2.5 The operator’s responsibility ... 16
2.6 Operating personnel ... 17
2.7 Special risks ... 18
2.8 Safety systems ... 21
2.9 Proceeding in case of danger and accidents ... 21
3 Transport, packaging and storage **22**
3.1 Transport inspection ... 22
3.2 Transport ... 22
3.3 Storage ... 23
4 Product description **24**
5 Design and function **26**
5.1 Design ... 26
5.2 Function description ... 27
6 Operating and display elements, operating modes **32**
6.1 The operating and display elements of the digital controller ... 32
6.1.1 The LED arrow ... 33
6.1.2 The 3.5“ colour display ... 34
6.1.3 The function keys ... 35
6.1.4 The operating keys ... 36
6.2 The display elements of the proportional Laser Receiver ... 37
6.3 Fault indications ... 40
6.4 Operating modes ... 40
6.5 Operating versions ... 41
6.5.1 Standard operation ... 41
6.5.2 Semi-automatic operation ... 41
6.5.3 Operation with auto zero adjustment ... 42
6.6 Variants of the cross operation ... 43

7 Installation and initial operation 44
7.1 Safety instructions ... 44
7.2 Assembly ... 45
7.3 Wiring ... 50
7.4 Initial operation ... 52
8 Operation 53
8.1 Safety instructions ... 53
8.2 First steps ... 54
8.2.1 Starting-up ... 54
8.2.2 Sensor selection ... 56
8.2.3 Display menu ... 59
8.2.4 Operator menu ... 60
8.2.4.1 Configuration menu ... 66
8.2.4.2 Info line ... 71
8.2.5 Switch on keyboard lighting ... 72
8.2.6 Refittings ... 73
8.2.7 Power-down ... 73
8.3 Working with the Digi-Slope Sensor ... 74
8.3.1 Adjustment of the actual value ... 74
8.3.2 Controlling with the Digi-Slope Sensor ... 76
8.4 Zero adjustment ... 77
8.5 Working with the Sonic-Ski® plus ... 79
8.5.1 Assembly and setting ... 79
8.5.2 Controlling with theSonic-Ski® plus when ground sensing ... 81
8.5.3 Controlling with the Sonic-Ski® plus when string line sensing 82
8.6 Working with the Digi-Rotary Sensor ... 83
8.6.1 Assembly and setting ... 83
8.6.2 Controlling with the Digi-Rotary Sensor ... 84
8.7 Working with the Dual-Sonic Sensor ... 85
8.7.1 Assembly and setting ... 85
8.7.2 Controlling with the Dual-Sonic Sensor ... 86
8.8 Working with the Wire-Rope Sensor ... 87
8.8.1 Assembly and setting ... 87
8.8.2 Controlling with the Wire-Rope Sensor ... 88
8.9 Working with the Big Sonic-Ski® ... 89
8.9.1 Assembly and setting ... 89
8.9.2 Controlling with the Big Sonic-Ski® ... 93
8.9.3 Quick sensor change ... 94
8.10 Working with the proportional Laser Receiver ... 96
8.10.1 Security instructions ... 96
8.10.2 Assembly and setting ... 97
8.10.3 Controlling with the proportional Laser Receiver ... 99
8.11 Working with the Power Mast and the prop. Laser Receiver ... 100
8.11.1 Safety instructions ... 100
8.11.2 Assembly and setting ... 101
8.11.3 The mast menu ... 103
8.11.4 Controlling with the Power Mast and the prop. L. Receiver 109
8.12 Working with the 3D TPS ... 111
8.12.1 Assembly and setting ... 111
8.12.2 Controlling with the 3D TPS ... 112

8.13 Working with the 3D GNSS 113
8.13.1 Assembly and setting 113
8.13.2 Controlling with the 3D GNSS 114
8.14 Working with the 3D Slope Sensor 115
8.14.1 Assembly and setting 115
8.14.2 Adjustment of the actual value 115
8.14.3 Controlling with the 3D Slope Sensor 116
8.15 Path-dependent operation with the Digi-Slope Sensor 117
8.15.1 Controlling with the path-dependent Digi-Slope Sensor 118
8.16 Cross operation 121
9 Service and maintenance 124
9.1 Cleaning and drying 124
9.2 Repair 125
10 Leads on troubleshooting 126
10.1 Safety instructions 126
10.2 Fault finding and troubleshooting 127
11 Technical data 142
12 Declarations of conformity 151
13 Definition of terms / Glossary 159

1 General information

1.1 About this manual

Preface

This user manual contains basic information to be considered at the operation and maintenance of MOBA-matic II.
Observing all security instructions and guidelines given here is indispensable for secure operation.
Therefore this user manual has to be read and applied without fail by any person assigned with working processes at the machine, such as operation, disturbance elimination and maintenance (service, care).

This manual is a part of the product and as the case may be has to be passed to third persons or following owners. It has to be permanently kept at the usage site and be available for the operating personnel.

Furthermore the local accident prevention regulations for the product's operational area, the general safety regulations as well as the manufacturer's safety regulations have to be observed.

Considering the multitude of possible applications the MOBA-matic II's function range in this manual mainly is described using the example of a paver. According to experience, this is the machine type the MOBA-matic II is most used with.

The MOBA-matic II is available with various sensor combinations. Please always use this user manual when working with your MOBA-matic II system.
In case your system is not equipped with all sensors, please disregard the respective descriptions.

Subject to alteration

We are eager to ensure the correctness and up-to-dateness of this user manual. To preserve our technological advance, it can be necessary to undertake modifications of the product and its operation without prior notice which under circumstances may not correspond to this manual. In that case your local MOBA-supplier will provide you with a new manual. We exclude liability for disturbances, failures and resulting damages.

Illustrations

The illustrations in this user manual shall provide better understanding. It may occur that illustrations in this manual are not drawn to scale or slightly differ from the original.

1.2 Explanation of symbols

Warning notices

In this user manual warning notices are marked by symbols. These notices are led in by signal words that indicate the degree of the endangerment.
Under all circumstances observe these notices and proceed carefully to prevent accidents, personal injuries and material damages.

⚠ DANGER

... indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

⚠ WARNING

... indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

⚠ CAUTION

... indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

NOTICE

... indicates a potentially hazardous situation which, if not avoided, could lead to material damages.

Tips and recommendations

NOTE!
... emphasizes useful tips and recommendations as well as information referring efficient and failure-free operation.

Step by step

Step-by-step instructions to be carried out by the operating personnel are numbered.

1) …
2) …
3) …

Enumerations

- Enumerations are marked with a black dot.
- …
- …

1.3 Limitation of liability

All statements and notes in this user manual have been compiled under consideration of current standards and regulations; the state of technology as well as our long-time expertise and experience.

The manufacturer excludes any liability for damages caused by:

- Inappropriate assembling and installation
- Non-observance of the user manual
- Non-intended and improper use
- Use beyond operation limits
- Deployment of insufficiently qualified and trained personnel
- Use of unauthorized spare parts and accessory
- Rebuilding of the product

In special models, demands of additional order options or due to latest technical alterations the actual scope of delivery can differ from the explanations and elaborations described here.

1.4 Copyright protection

See page 2 in this user manual.

1.5 Related documents

For additional information on the Big Sonic-Ski's® assembly and the structure and setting of the MOBA-matic II's parameter menu please see the following manuals:

10-02-021X0	Installation manual(s) Big Sonic-Ski®
10-02-00783	Parameter settings MOBA-matic II CAN A02(EN)

1.6 Spare parts

Original spare parts and accessory authorized by the manufacturer provide safety.
The use of other parts can limit the user's right to put the product into operation and remove the liability for all consequences emerging from use.

⚠ CAUTION

Risk of injury caused by inaccurate spare parts!
Inaccurate, faulty or unauthorized spare parts can cause damages, malfunctions or complete failure and impair safety.
Therefore: • Only use the manufacturer's original spare parts.

Ask your local MOBA-dealer for original spare parts.

1.7 Final decommissioning / disablement

At the final decommissioning the product has to be disabled to protect it against recommissioning - especially by unauthorized third persons.

1) Switch off the power supply of the product.
2) Disconnect all poles.
3) Disassemble the product.
4a) In components with connecting cables → cut off the connecting cable.
4b) In components with connecting plugs → destroy the connecting plug mechanically.

1.8 Disposal

Packaging

During transport the products are protected ex works by special packaging, which consists of environment-friendly, easy dividable materials and are recyclable.
We recommend waste managers for the packaging disposal.

Product

The product must not be disposed together with the domestic waste. It has to be properly disposed.
Unless no agreements to take back and dispose have been made, recycle the disjointed components after disassembling them appropriately.

- Scrap metallic material rests
- Dispose electronic components according to the local regulations

⚠ CAUTION

Risk of injury caused by inappropriate disposal of the product!
When burning plastic parts toxic gases emerge that can cause illnesses.
Therefore: • Dispose the product properly according to the current national country-specific disposal regulations.

⚠ CAUTION

Risk of injury caused by inappropriate disposal of the product!
Careless disposal enables unauthorized persons to improperly use the product. In doing so these persons and/or third persons can be severely injured and also pollute the environment.
Therefore: • At all times protect the product against the access of unauthorized persons.

1.9 Terms of guarantee

This user manual does not contain any covenant of guarantee.
The terms of guarantee are part of the sales and delivery conditions of MOBA MOBILE AUTOMATION AG (MOBA).

1.10 Customer service

For technical advice please ask your local MOBA-dealer.

2 Basic safety instructions

Preface

This section outlines all important safety matters referring the personnel's optimal safety as well as failure-free operation.
These instructions shall enable operator and user to recognize potential risks of use and as possible prevent them in advance.

The operator has to ensure that every user understands and observes these instructions.

2.1 Intended use

2.1.1 Conventional use

MOBA-matic II has been exclusively designed and constructed for conventional use as described here.

- *Automatic grade or slope control of the machine's tool (e.g. a paver's screed) according to the reference height; the reference line or the setting of the set point.*
- *Detecting a reference line using sonic sensors.*
- *Detecting a reference height and/or reference slope using laser or sonic sensors.*
- *Detecting the tool's slope using a slope sensor.*
- *Setting various parameters of the machine's hydraulic system performance.*

Any other use not listed here as well as any application not complying with the technical data is not conventional and inappropriate.

⚠ WARNING

Risks caused by inappropriate use!
Any non-conventional use and/or different operation of the product can lead to hazardous situations.
Therefore: • Only use the product in a conventional manner.

2.1.2 Inapproriate use

- Non-conventional use
- Exceeding of the limit values given on the data sheet
- Use of the product without instructions
- Use of the product beyond the limits of use
- Invalidation of safety equipment
- Removal of indicating or warning labels
- Opening of the product (unless not explicitly permitted for special purpose)
- Rebuilding or alteration of the product
- Commissioning of the product after misappropriation
- Use of the product in spite of obvious defects or damages
- Use of the product with unauthorized accessory from foreign manufacturers
- Use of the product at insufficiently secured construction sites (e.g. at road works)
- Use of the product to control machines, systems or moveable objects if these are not equipped with an additional control device and superordinated safety unit

2.2 Limits of use

The product has been designed for use in habitable atmosphere. It must not be used in hostile or explosive environments.

Before working in hazardous environments, near electrical systems or in similar situations the operator has to contact local safety offices and safety representatives.

2.3 Alteration and rebuilding of the product

To prevent risks and ensure optimal performance neither alterations nor attachments or rebuildings of the product may be carried out without the manufacturer’s explicit permission.

2.4 Contents of the user manual

Any person charged with operations at or with the product has to have read and understood the user manual before starting the working processes. This is also due if the person mentioned has already worked with such or a similar product or has been trained by the manufacturer or supplier.

2.5 The operator's responsibility

The MOBA-matic II is used in the industrial sector. Therefore the operator of the product is liable to the legal responsibilities for operational safety.
Besides the operational safety instructions in this manual the safety, accident prevention and environmental protection regulations valid for the operational area of the product have to be observed.

Particularly applying:

- The operator has to inform himself/herself about the current operational safety regulations and, in a risk assessment, detect additional risks that are caused by the special working conditions at the usage site of the product. These then have to be implemented in the form of directives for the product's operation.
- These directives have to be kept near to the product and permanently be available for the persons working with it.
- The operator has to clearly define the personnel's responsibilities referring the appliance.
- The operator has to ensure that the user manual's content is fully understood by the operating personnel.
- The statements of the user manual have to be observed thoroughly and unrestrictedly!
- The operator has to ensure that all maintenance, inspection and assembling processes are carried out by qualified specialized personnel, which have informed themselves sufficiently by closely studying the user manual.
- The operator informs the manufacturer or the authorized dealer if any safety defects occur at the product or during operation.

2.6 Operating personnel

⚠ WARNING

Risk of injury caused by insufficient qualification!
Inappropriate handling of the product can lead to severe personal injuries and material damages.
Therefore:
- Have special working processes solely carried out by persons mentioned in the respective sections of this manual.

In this user manual the following qualifications are specified for the different areas of operations:

Layperson

A person neither qualified as skilled worker nor as instructed person is referred to as aide without expert knowledge or as layperson.

Instructed person

A person instructed by the operator or manufacturer about the assigned tasks and potential risks in case of inappropriate behaviour and if required semi-skilled and informed about the necessary safety arrangements and measures is referred to as instructed person.

Qualified specialized personnel

Qualified specialized personnel in terms of this user manual are persons who are familiar with the assembling, commissioning and operation of the product and possess qualifications corresponding to their tasks. Due to specialist training, knowledge and experience as well as knowledge of the relevant regulations the specialized person is able to recognize hazards and avoid potential risks that can occur during operation or maintenance of the product.
Among other things also the knowledge of first-aid and the local emergency services is necessary.

2.7 Special risks

Preface

In the following section the residual risks emerging from the risk analysis are specified.
Please consider the safety instructions and warning notices mentioned here and in the following sections to reduce dangers to health and avoid hazardous situations.

Electric current

⚠ DANGER

Risks caused by electric current!

When working with the laser mast or the power mast next to electric systems e.g. overhead powerlines or electric railways, there is danger to life due to electric shock.

Therefore:
- Keep sufficient safety distance to electric systems. If working at such systems is indispensable, inform the responsible authorities before starting the working process and follow their instructions.

Moving components

⚠ CAUTION

Risk of injury caused by moving machine parts!

During the controlling of the tool the machine's components and assembly groups are moved manually or automatically. Rotating and/or linearly moving components and assembly groups of the machine can cause severe injuries and material damages.

Therefore:
- Keep persons away from the machine's and the tool's working range respectively.
- Remove objects from the machine's and the tool's working range respectively.
- Do not interfere with the moving components during operation.
- Always switch off the product before leaving the driver's seat or when the machine is standing still.
- Do not carry out any operations at the sensorics when the system is in automatic mode.

Overlapping machine parts

⚠ CAUTION

Risk of injury caused by overlapping machine parts!
Subsequently assembled system components (e.g. sensors) can overlap the typical machine dimensions. This can lead to injuries and material damages.
Therefore:
- Ensure that the machine is operated by a qualified and experienced operator.
- Keep away persons from the machine's and the tool's working range respectively.
- Remove objects from the machine's and the tool's working range respectively.

Malfunction

⚠ WARNING

Risk of injury caused by malfunction!
Uncontrolled machine actions caused by the malfunction of a system component can lead to severe personal injuries in the machine's working range or cause material damage.
Therefore:
- Ensure that the machine is operated, controlled and inspected by a qualified and experienced operator, who has to be able to induce emergency measures e.g. an emergency stop.
- Keep away persons from the machine's and the tool's working range respectively.
- Remove objects from the machine's and the tool's working range respectively.
- Secure the construction site.

Lacking instruction

⚠ WARNING

Risk of injury caused by lacking or insufficient instruction!
Lacking or insufficient instruction can lead to operating errors or incorrect use. This can lead to severe personal injuries as well as severe material and environmental damages.
Therefore:
- Observe the manufacturer's safety instructions and the operator's directives.

Insufficient safeguarding

⚠ WARNING

Risk of injury caused by insufficient safeguarding!

Insufficient safeguarding of the construction site and the component's location, e.g. of the laser emitter, can lead to hazardous situations in traffic and at the construction site.

Therefore:
- Ensure sufficient safeguarding of the construction site.
- Ensure sufficient safeguarding of the single components' locations.
- Observe the country-specific safety and accident prevention regulations as well as the current road traffic regulations.

Faulty measurement results

NOTICE

Risks caused by faulty measurement results!

Faulty measurement results due to use of a dropped product, another illegitimate demand or an alteration can lead to severe material damages.

Therefore:
- Do not use obviously damaged products.
- Before reusing a dropped component carry out a check measurement.

2.8 Safety systems

The MOBA-matic II does not feature an own superordinate safety system.

However:
The MOBA-matic II controller features an input that can be used to externally influence the control. To do so the controller's processor monitors the voltage applied to pin A of the 12-pin socket.
In a software menu it can be determined at which applied voltage level the control shall be switched off (depending on the wiring).
The installation of an emergency stop switch is in the operator's field of responsibility and is strongly recommended.

Additionally, in case of an error all diodes of the MOBA-matic II controller's LED arrow flash and this way draw the operator's attention to an error.

2.9 Proceeding in case of danger and accidents

Preventive measures

- Always be prepared for possible accidents or the event of fire!
- Keep first-aid-equipment (ambulance box, blankets etc.) within reach.
- Familiarize the personnel with accident notification and first-aid-equipment as well as emergency services.
- Keep the access routes clear for emergency vehicles.

If the event occurs: proceed appropriately:

- Immediately put the product out of action by using the emergency stop.
- Induce first-aid-measures.
- Recover persons out of the hazard zone.
- Inform the responsible person at the usage site.
- Alarm a doctor and/or the fire brigade.
- Keep the access routes clear for emergency vehicles.

3 Transport, packaging and storage

3.1 Transport inspection

To ensure sufficient protection during transport the products have been packed carefully.
Please immediately check the delivered goods for completeness and transport damage.

In case of external transport damage proceed as follows:

- Do not or only under reserve accept delivery.
- Record the extent of the damage on the transport documents or the transporter's bill of delivery.
- Induce complaint.
- Do not put obviously damaged products into operation.

Claim every defect as soon as it is detected. Compensation claims can only be asserted complying with the current claim periods.

3.2 Transport

When taking your equipment to the usage site or in the field always ensure that the product is transported in secured and suitable containers.
Never transport the product loosely in the car. The product's function can be severely harmed by hits and thrusts.

In case of transportation by railway, plane or ship always use the original packaging, transport containers and transport boxes or as the case may be analogical packaging. The packaging protects the product against hits and vibrations.

3.3 Storage

Only store the product in well aired, dry rooms. During storage protect it against dampness and preferably use the original packaging.

Avoid strong thermal fluctuation during storage. Incipient formation of water condensation can harm the product’s function.

When storing observe the product’s temperature limits; especially in summer when the equipment is stored in vehicle interiors. For the valid storage temperatures see the product’s technical data.

4 Product description

The MOBA-matic II is a universal control system for building machines of all kind.
The extensive range of sensors used for distance and slope measurement as well as its excellent operating convenience and reliability make MOBA-matic a flexible and efficient control system for pavers, concrete road finishers, mastic asphalt finishers, milling machines, caterpillars, kilvers and motor graders.

The system is based on ultra-modern micro-processor technology and works with a so-called ”CAN-bus“ (**C**ontrolled **A**rea **N**etwork).
This CAN-bus represents the latest state of the art in electric motorcar equipment and therefore guarantees maximum system safety. Furthermore, it facilitates the system’s central operation and, due to its modular design, its successive extension. Therefore you may fit in new sensors anytime and without any problems, so that the system will always suit the application requirements.
The heart of the system, the digital controller, identifies all connected sensors automatically as soon as the system is switched on.

In addition to this, the 3D-matic, using total stations or GNSS receivers for 3D control, can be connected to the MOBA-matic II.

Product designation

Every system’s component (except the cables) is equipped with a type label.
The type label contains the CE-mark (1), the detailed device designation (2), the product’s item number (3) as well as a consecutive serial number (4).

Conformity See section “Declarations of conformity“ in this manual.

Product data See section “Technical data“ in this manual.

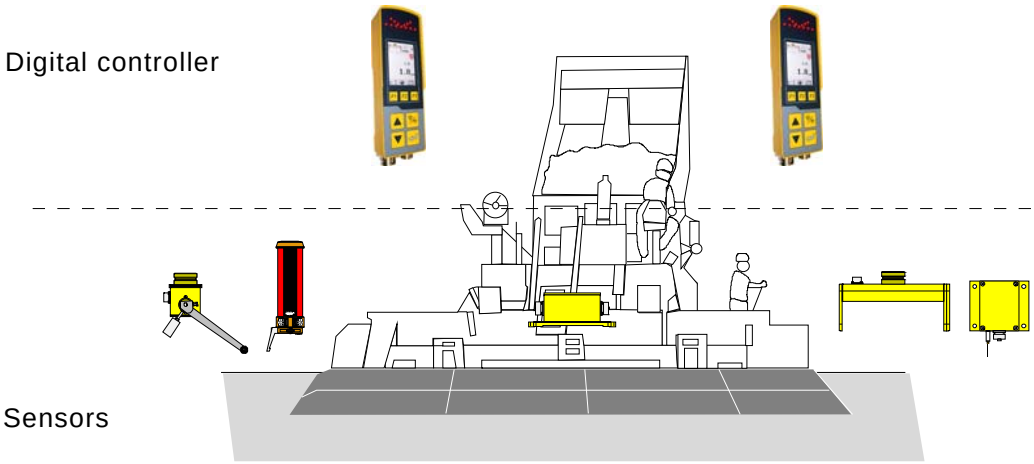
5 Design and function

Preface

This section gives an overview of the MOBA-matic II's design and the product's basic functionality.

5.1 Design

The MOBA-matic II system's centrepiece is the digital controller. Every control loop and every machine side respectively requires an own controller and at least one related sensor.
Depending on the machine and application type the operator may compile the system individually.
To do so, from the great pool of available sensors the operator simply chooses the sensor that meets the respective requirements best and combines it with the digital controller.
The CAN bus allows to simultaneously connect several sensors to one controller. The operator then selects the respectively active sensor with the help of the software.



5.2 Function description

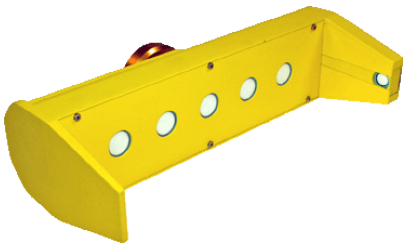
The digital controller *MMC-2000* contains all buttons necessary to control the system, visual indicators that show the system's current state at any time as well as the valves' power outputs.
Here the sensor signals and keyboard entries are processed and passed on to the hydraulics.

The Digi-Slope Sensor *SLOS-0150* works with a high-precise, electro-mechanical meter movement and allows the detection of the tool's slope.

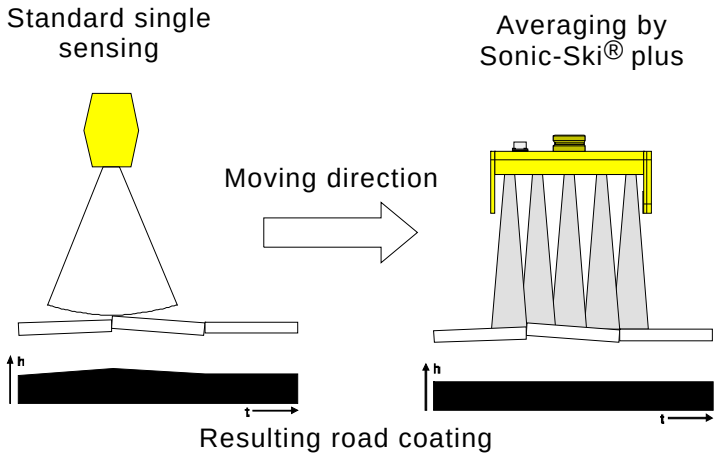
The Digi-Rotary Sensor *ROTS-0300* is used for distance measurements and senses the measurement values of an existing reference via mechanical implements.
This may be a taut and measured rope as well as a surface area (e.g. an already finished road pavement).

The Wire-Rope Sensor *ROPS-0900* receives the measurement value via an extendable steel rope and is often used for milling works.
It allows distance measurements and measures in a range of 900 mm.

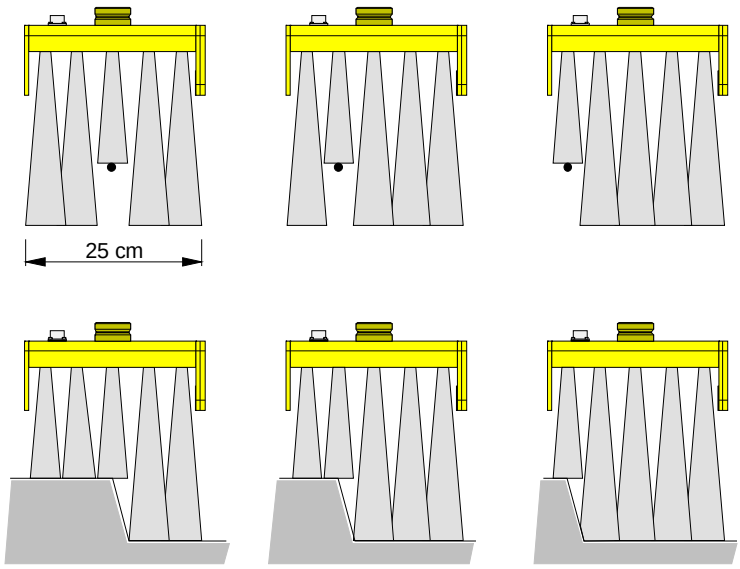
The Dual-Sonic Sensor *DUAS-1000* is used for distance measurements and works with ultrasonic technology.
With a reference measurement to a bail at a defined distance parallel to the actual distance measurement the dual-sonic sensor's value is temperature-compensated.



The Sonic-Ski® plus *SKIS-1500* is used for distance measurements and works with five ultrasonic sensors. A sixth sensor serves to compensate the temperature.
The Sonic-Ski® plus works in a measurement range from 25 cm to approx. 100 cm.
When ground sensing an average value is generated from the measurement values of the Sonic- Ski® plus' five ultrasonic sensors.

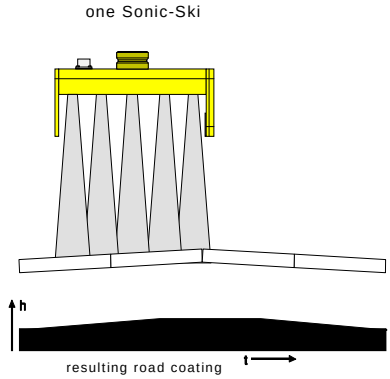


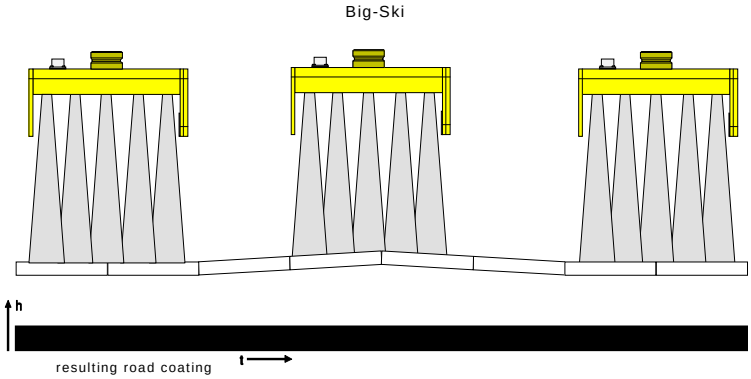
When rope sensing the Sonic-Ski® plus is not only able to measure the distance to the reference but also detect the rope's or an edge's position under the sensor heads over its full working range of approx. 25 cm.



The Big Sonic-Ski® revives the averaging principle already known from the Sonic-Ski® plus.
To do so usually three sensors (e.g. 3x Sonic-Ski® plus or 2x Dual-Sonic Sensor [front and rear] + 1x rope sensor [central]) are installed over the whole machine length – or with the help of respective mechanics even beyond.
In exceptional cases the averaging can also be done via two sensors (e.g. Sonic-Ski® plus front and rear).

After small irregularities and foreign objects have already been neutralized by the averaging of every single Sonic-Ski® plus, the Big Sonic-Ski® build-up now also averages and reduces waves and small drawn-out level differences in the subsoil's longitudinal profile.





The proportional Laser Receiver LS 3000 is a sensor used for distance measurements working with all established rotary lasers as for example red-light transmitters (helium, neon) und infrared transmitters.
Among other things it is used to construct flat sites and works in a reception range of 29 cm.

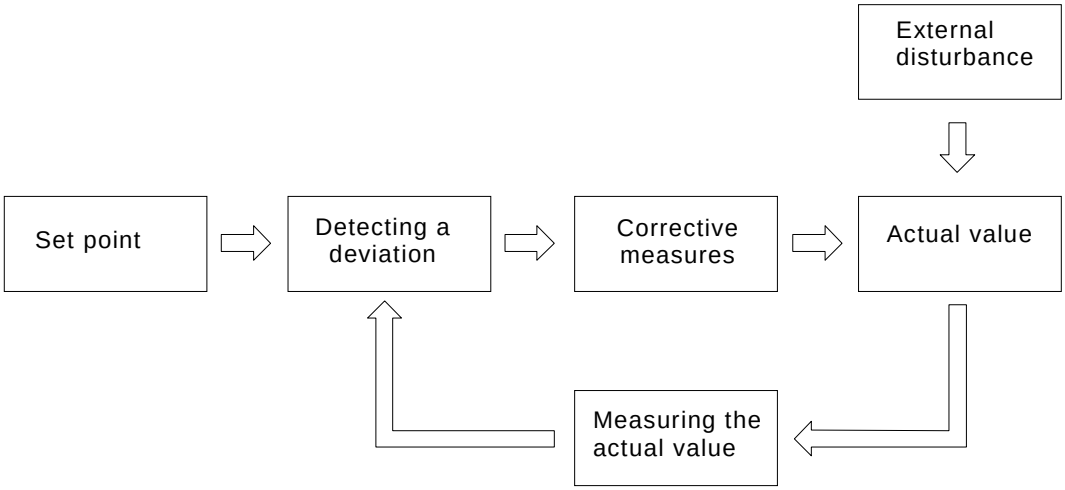
The multi-channel Laser Receiver *CLS-3000* is a sensor used for distance measurements working with all established rotary lasers as for example red-light transmitters (helium, neon) und infrared transmitters.
Among other things it is used to construct flat sites and works in a reception range of 21 cm.

The power masts are only used in connection with the laser receivers.
The Power Mast ETM-900 increases the laser receiver's reception range considerably, since the sensor can follow up the entire adjustment range of the lift cylinder.
As another advantage the user can position the laser receiver very quickly and comfortably in the transmitter's laser beam by using the MOBA-matic II's operating buttons.
In connection with the power mast the mode for automatic laser search can also be used for height measuring an area.

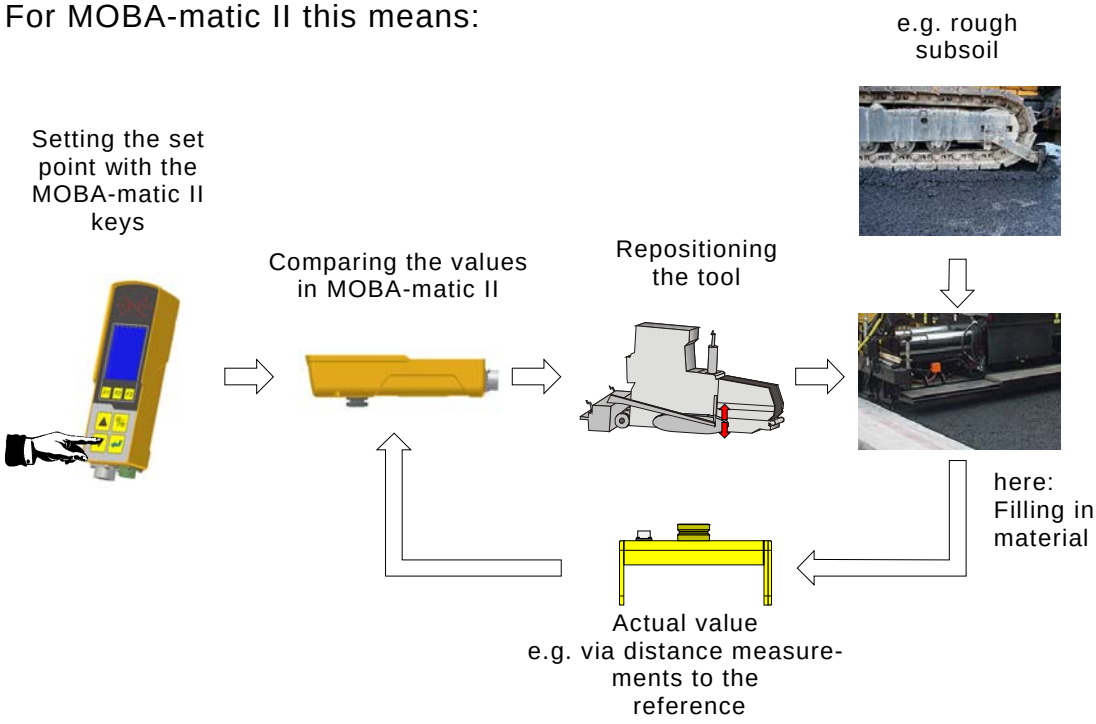
The MOBA-matic II supports working with 3D.
The machine's determination of position can be carried out via a satellite receiver (GNSS) as well as a total station and a prism (TPS).
The machine computer compares the current measured values to the planning data and the correction data is adjusted by the MOBA-matic II.

Irrespective which sensor is used at the MOBA-matic II's digital controller, the control principle stays the same:

A control's basic principle is the ongoing: **Measuring - Comparing – Setting**
A control loop serves to put a preset physical value (control variable) to a favoured value (set point) and keep it there, irrespective of potentially occurring errors. To fulfil the control task the control variable's instantaneous value – the actual value – has to be measured and compared to the set point. In case of deviations appropriate adjustments have to be made.



For MOBA-matic II this means:


e.g. rough subsoil
Setting the set point with the MOBA-matic II keys
Comparing the values in MOBA-matic II
Repositioning the tool
here: Filling in material
Actual value e.g. via distance measure-ments to the reference

6 Operating and display elements, operating modes

Preface

This section gives an overview of all elements necessary for the product's appropriate operation, described in the section "Operation".

6.1 The operating and display elements of the digital controller

The front side of the MOBA-matic II's digital controller features all keys necessary for the system's extended operation, several function LEDs as well as a colour display which at any time shows the system's current state.

The digital controller's front side can be devided into 4 main function groups:

1) The LED arrow

2) The 3.5" colour display

3) The function keys F1 to F3

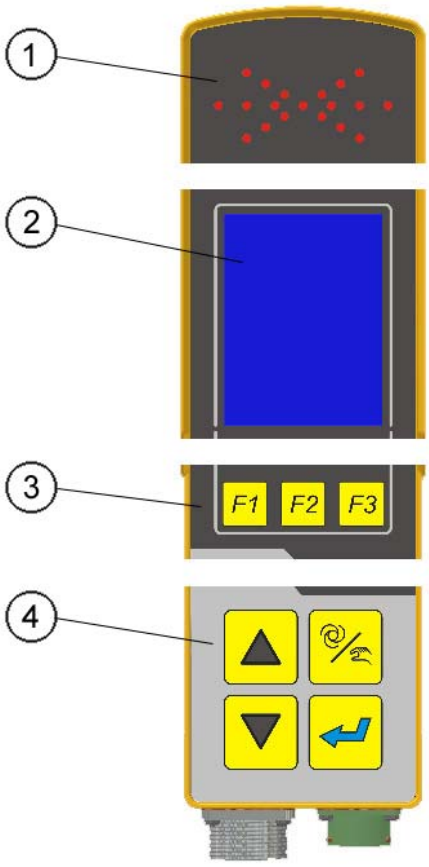
4) The operating keys

The Up key

The Down key

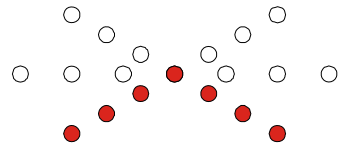
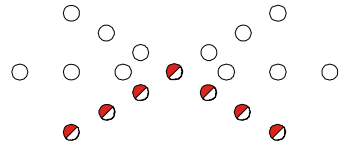
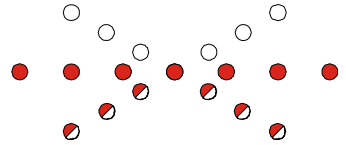
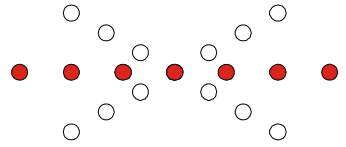
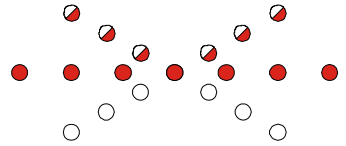
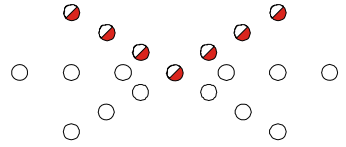
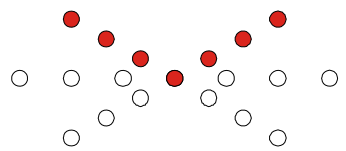
The Auto-/Manual key

The Enter key



6.1.1 The LED arrow

The LED arrow shows the operator the respectively driven valve output's current state. It is particularly helpful in case the user is standing at a larger distance from the controller or during stronger solar radiation.

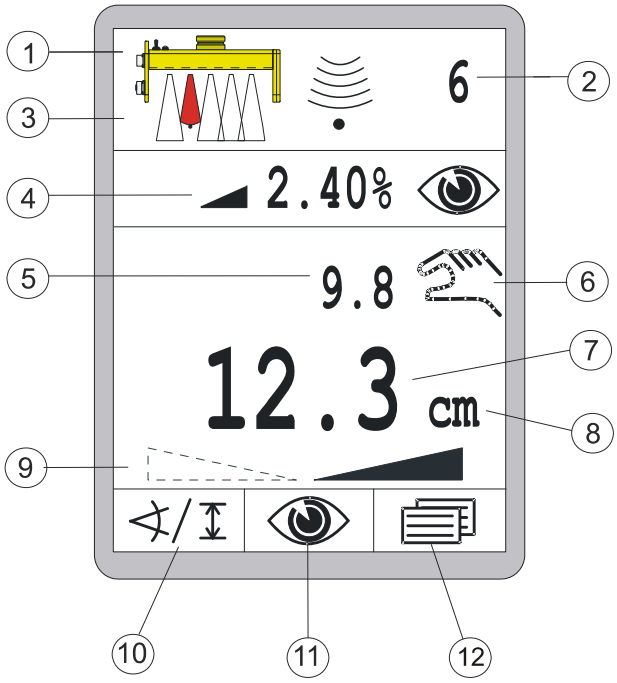
Display LED arrow	Control deviation	Controller output
	High control deviation	Controller output RAISE constantly on
	Medium control deviation	Controller output RAISE clocks with high pulse width
	Low control deviation	Controller output RAISE clocks with low pulse width
	No control deviation	Controller outputs inactive
	Low control deviation	Controller output LOWER clocks with low pulse width
	Medium control deviation	Controller output LOWER clocks with high pulse width
	High control deviation	Controller output LOWER constantly on

Legend: ○ = LED off ◐ = LED flashing ● = LED on

6.1.2 The 3.5“ colour display

The 240 (w) x 320 (h) pixel, backlit colour display shows the sensor type selected for the respective control loop as well as its set point and actual value during the normal work project.
In different menus options and parameters are displayed or system advice and instructions on configuration and settings are provided.

Example of the working window when working with the Sonic-Ski® plus:



1) Currently selected sensor
2) Set sensitivity of the currently selected sensor
3) Rope position under the sensor (only Sonic-Ski® plus rope)
4) Configurable info line
5) Value currently measured by the sensor (actual value)
6) Currently selected operating mode: = Manual (manual mode) = Automatic mode
7) Set value to refer to when adjusting (set point)
8) Physical measuring unit of the currently selected sensor
9) Direction of cross slope (only Digi-Slope Sensor)
10) Function of key F1 (here: call up sensor selection)
11) Function of key F2 (here: call up view menu)
12) Function of key F3 (here: call up operator menu)

The active sensor's actual value (5) and set points (7) are displayed with a sign. In addition, the set point is displayed with a physical measuring unit (8).
The sign indicates a positive or a negative numerical value.

The display only shows the negative sign, " - " !

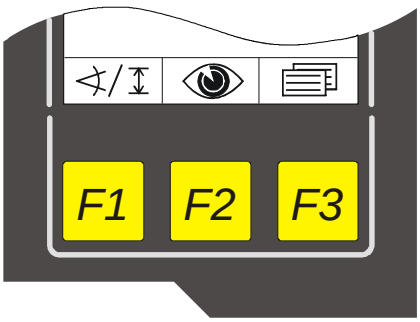
The direction arrows (9) only appear when the Digi-Slope Sensor has been selected as active sensor.
The displayed arrow's slope direction is the sign for the Digi-Slope Sensor's value (left slope or right slope). Both arrows simultaneously only are displayed together with „0.0 %".

The displayed values' resolution and physical measuring unit can be set in the configuration menu – separately for distance sensors and slope sensors.

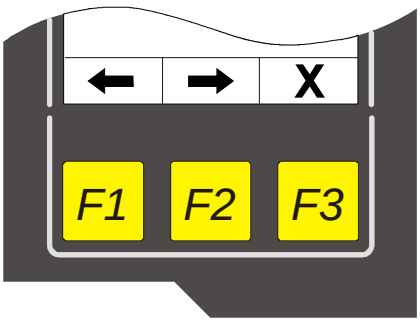
6.1.3 The function keys

Depending on the window or menu you entered, the function keys F1 to F3 are assigned differently.
Their respective function is explicitly indicated on the display by a symbol, making navigation in the individual menus clear and easy. An empty text field above a function key shows that this key is without function in the current menu.

Examples:



Assignment of the function keys in the working window



...and in the operator menu

6.1.4 The operating keys

To operate the MOBA-matic II's basic control functions 4 keys are sufficient.

Up key & Down key

With the Up key or the Down key the control's set point is changed in automatic mode.

In manual mode the related valve output is driven for the time of the respective keystroke.

In the menus they serve to select menu items or set parameters.

Auto/Manual key

The Auto/Manual key is used to switch between the operating modes Manual, *Semi-automatic (optional)* and Automatic.

Enter key

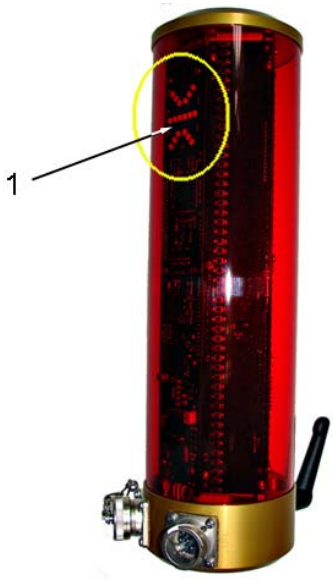
With the Enter key the set point is equated with the actual value and/or a zero adjustment is carried out.

6.2 The display elements of the proportional Laser Receiver

The laser receiver is equipped with an LED arrow (1) – similar to that of the digital controller.

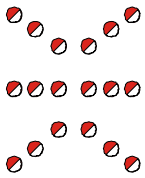
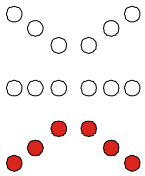
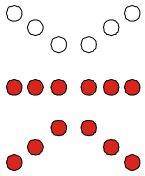
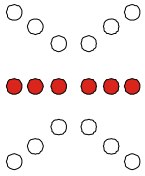
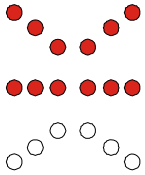
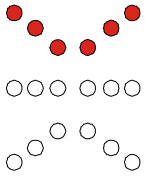
The function of the laser receiver's LED arrow differs depending on the operating mode the digital controller it is connected to is currently in.

In the operating mode "Manual" it serves as positioning aid; in the operating mode "Automatic" it shows the valve output's status.



The proportional Laser Receiver's display in the operating mode "Manual"

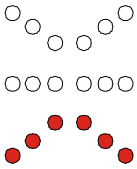
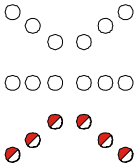
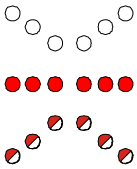
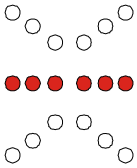
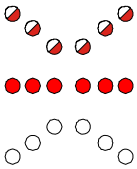
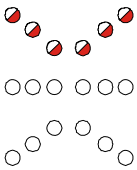
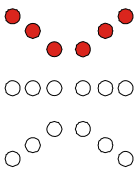
In the operating mode "Manual" the laser receiver's LEDs show the operator how to shift the sensor in a way that the laser beam centrally hits the receiving range.
They serve as positioning aid.

Display	Deviation	Action
	No laser beam hits the receiver;	
	The laser beam hits the receiver above the centre;	Move the laser receiver and the mast respectively upwards;
	The laser beam hits the receiver max. 2 cm above the centre;	Move the laser receiver and the mast respectively slightly upwards;
	The laser beam hits the receiver at the centre;	
	The laser beam hits the receiver max. 2 cm below the centre;	Move the laser receiver and the mast respectively slightly downwards;
	The laser beam hits the receiver below the centre;	Move the laser receiver and the mast respectively downwards;

Legend: ○ = LED off ◐ = LED flashes ● = LED on

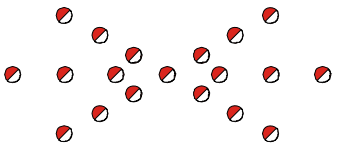
The proportional Laser Receiver's display in the operating mode "Automatic"

In the operating mode "Automatic" the laser receiver's LEDs visualise the status of the respective driven valve output to the operator.
They now are working analogue to the digital controller's LED-display.

Display	Control deviation	Controller output
	High control deviation	Controller output RAISE constantly on
	Medium control deviation	Controller output RAISE clocks with high pulse width
	Low control deviation	Controller output RAISE clocks with low pulse width
	No control deviation	Controller outputs inactive
	Low control deviation	Controller output LOWER clocks with low pulse width
	Medium control deviation	Controller output LOWER clocks with high pulse width
	High control deviation	Controller output LOWER constantly on

Legend: ○ = LED off ◪ = LED flashes ● = LED on

6.3 Fault indications



= LED flashes

A simultaneous flashing of all LEDs of the digital controller's LED arrow indicates a disturbance.
Often these disturbances are not really defects but point out an attempt to operate under unauthorized conditions.
For information on troubleshooting please see the description of working with the individual sensors as well as the section "Leads on troubleshooting".

6.4 Operating modes

Manual
In the operating mode "Manual" the tool is directly moved via the Up/Down keys of the digital controller.

Automatic
In the operating mode "Automatic" the set point for the tool is changed via the digital controller's Up/Down keys.
In case the comparison of the measured actual value and the set point results in a difference, the digital controller automatically actuates the outputs until this difference is corrected.

flashes

Semi-automatic[1]
In the operating mode "Semi-automatic" the set point for the tool can be changed with the digital controller's Up/Down keys.
However, since the outputs are locked in this operating mode, the tool is not actuated.

[1] This operating mode appears in case the optional operating version including a semi-automatic mode has been activated by your MOBA dealer (see next page) or if the MOBA-matic II System has been locked via the function "External manual".

6.5 Operating versions

Selecting from three versions your MOBA dealer can set the controller's operation for you. The operation differs as follows:

6.5.1 Standard operation

In the operating mode **"Automatic"** the set point is gradually adjusted in **1 mm** steps as long as the respective key is pressed.
The tool is moved corresponding to the presetting.
The changed set point is shown in the display.

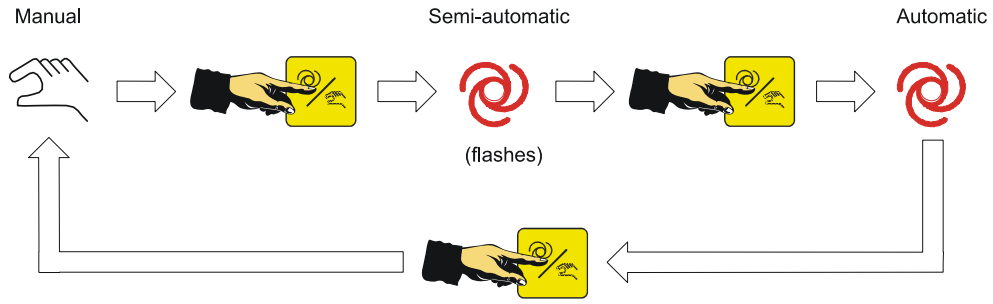
By simultaneously pressing the Enter key and the Up key or the Down key the displayed set point can be changed without influencing the tool position.

6.5.2 Semi-automatic operation

In the operating mode **"Semi-automatic"** and **"Automatic"** the set point is gradually adjusted in **1 mm** steps as long as the respective key is pressed.
Since the outputs are locked in the **"Semi-automatic"** mode, the tool first is not actuated.
When the operating mode "Semi-automatic" is switched to the operating mode **"Automatic"** the outputs are released and the control moves the tool corresponding to the presetting.
In both operating modes the changed set point is shown in the display.

By simultaneously pressing the Enter key and the Up key or the Down key the displayed set point can be changed without influencing the tool position.

With the Auto/Manual key the operating modes "Manual", "Semi-automatic" and "Automatic" are circularly switched.



6.5.3 Operation with auto zero adjustment

In the operating mode **“Automatic“** with every new stroke of the Up or the Down key the set point is adjusted by **2 mm** in the respective direction.
The tool is moved corresponding to the presetting.

After 5 seconds the displayed value is automatically adopted as zero point; i.e. the set point and the actual value are both set to 0.0.

The operation of the individual sensors in this manual is described according to the controller’s standard operation.
Specific differences of the operating versions (as for example the additional operating mode “Semi-automatic“ or the different step sizes when adjusting the set point) are not affecting the general operating process.

6.6 Variants of the cross operation

These special variants serve to operate the respectively other side's levelling "by remote control".
They are only available in a fully wired system, i.e. if both controllers are connected via CAN.

Your MOBA dealer can set the controller's operation choosing from four variants differing from each other as follows:

0 no cross operation available
1 only display of the other side
2 display and operation of the other side
3 display and operation of both sides in table form

Please find more detailed information in the chapter "Cross operation" in this manual.

7 Installation and initial operation

Preface This section's descriptions shall instruct the authorized personnel when installing and initially operating.

7.1 Safety instructions

The product's installation and initial operation may only be carried out by specialized personnel.

⚠ CAUTION

Risks caused by inaccurate installation!

Unauthorized rebuildings at the machine due to the product's installation and faults when installing may impair the machine's function and safety and therefore lead to hazardous situations or cause material damages.

Therefore:
- Have installation and initial operation solely carried out by accordingly instructed personnel.
- Observe the machine manufacturer's instructions! In case sufficient instructions do not exist, contact the machine manufacturer before installation.
- Safety and protective equipment that had to be deinstalled or removed due to the system's installation have to be reassembled or put back to function again immediately after the work has been completed.

7.2 Assembly

Preface

For the system component's dimension and the position of fixing holes please see the section "Technical data" in this manual.
When choosing the assembly sites for the individual components please consider the additional space required for plugging the connecting plugs in and out.

Assembly site & installation position

Due to the multitude of possible applications of the MOBA-matic II and the multitude of different machines only general information on the individual component's assembly site and installation position can be given here.

The digital controller

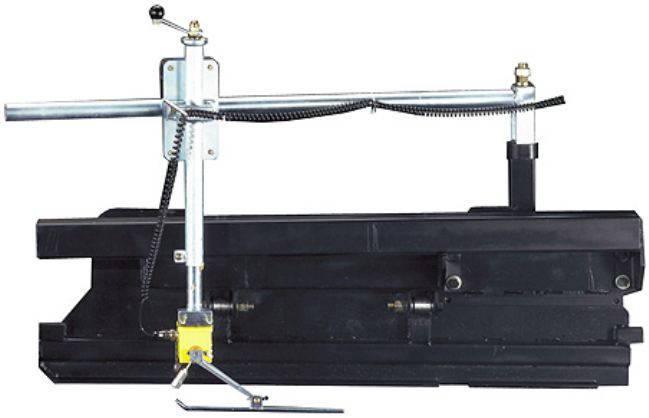
Your MOBA dealer will provide you with a fixture in which the digital controller can easily be clipped in.
Assemble the fixture at a position that allows convenient operation and from which the tool and the tool's adjustment unit are clearly visible.
Protect the controller from dirt and splash water. Shadowing improves the display's clearness.
The digital controller should be tilted downwards to let rain drain off the surface.

The Digi Slope Sensor

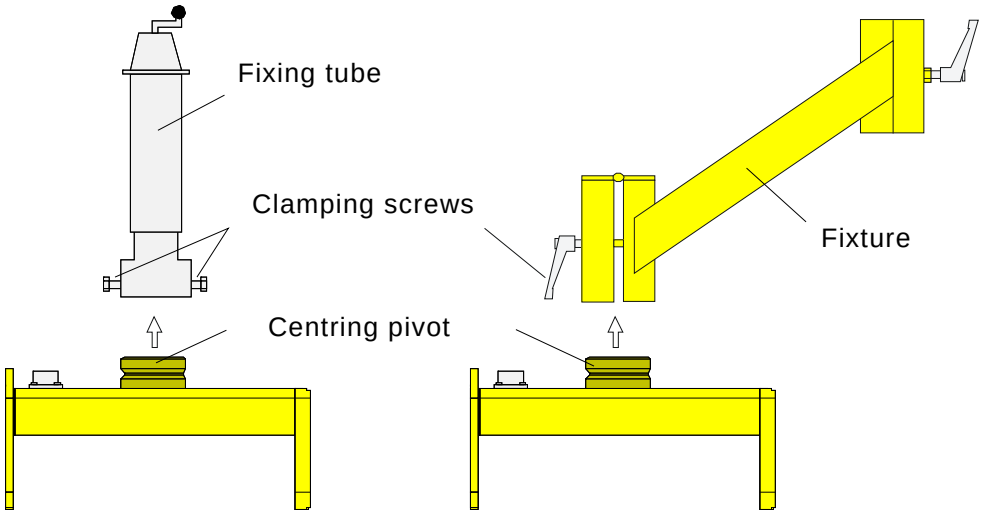
Mount the Digi-Slope Sensor in parallel to the tool's bottom edge at a machine part that executes all slope deviations to the same extent. This way the sensor's measured value exactly represents the tool's slope.
In a road miller the bottom part of the machine (e.g. on the milling drum housing) is preferred; in a paver the sensor is mounted on the transverse traverse between the tow arms.
For the assembly four fixing holes are provided in the fixing plate.
The plug connections have to be easily accessible to allow easy connection.
IMPORTANT! Note the sensor's mounting direction (the arrow on the housing cover points to the moving direction).

Fixture for grade sensors

For the grade sensor's holding fixtures a fixing tube has to be mounted at a suitable position (at the paver e.g. at the tow arm or at the milling machine at the chassis).
This fixing tube – with a round holding fixture for the MOBA grade sensors – should be height adjustable, swivelling and horizontally shiftable. See example below.
With the round sensor head and the swivelling holding arm the sensors can be installed over every reference without any problem (e.g. Sonic-Ski® plus in ground sensing or string line sensing mode).
Depending on the machine type this fixture may look different.



1) Loosen the clamping screws at the fixing tube.
2) Insert the round centring pivot at the sensor housing's upper side vertically into the fixing tube.
3) Twist the sensor housing in moving direction.
4) Fix the sensor's centring pivot with the clamping screws.

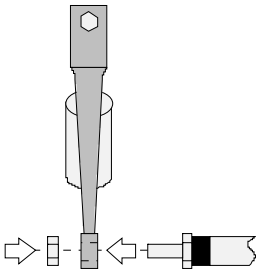


The Digi Rotary Sensor

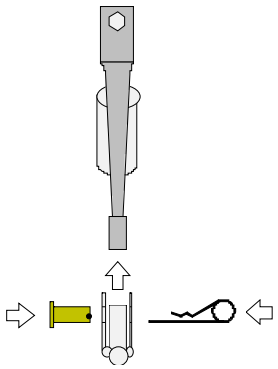
For sensing the different references with the Digi Rotary Sensor two auxiliary means are available.
The sensing tube is used for rope sensing; the sensing ski is used for area sensing.

Mounting the sensing tube to the sensing arm:

1) Loosen the nut at the sensing tube's thread.
2) Shift the sensing tube into the sensing arm's fixing ring.
3) Secure the sensing tube with the nut.

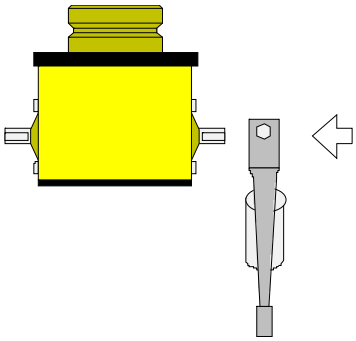


Mounting the sensing ski to the sensing arm:



1) Loosen the security splint from the sensing ski's bolt; remove bolt.
2) Position the ski's fixture over the sensing arm's fixing ring.
3) Push the bolt through the ski's fixture and the fixing ring.
4) Secure the bolt with the splint.

Mounting the sensing arm to the Rotary Sensor:

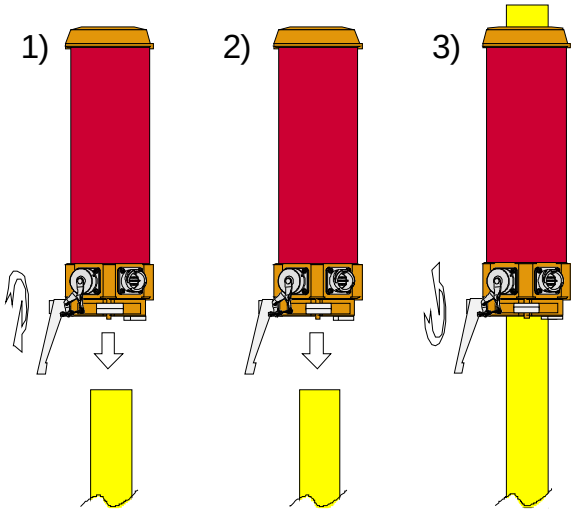


1) Turn the flat part of the axis to the sensor side averted from the plug.
2) Loosen the clamping screw at the sensing arm.
3) Plug the sensing arm onto the axis.
4) Screw the clamping screw to the flat part of the axis.

The Laser Receiver

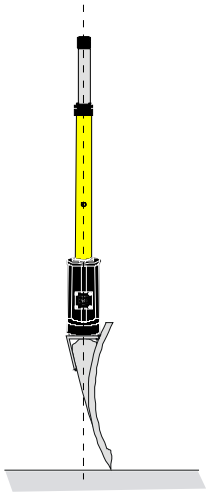
Mounting a Laser Receiver to the mast tube is easy:

1) Open the mounting clamp.
2) Push the Laser Receiver over the mast tube.
3) Shut the mounting clamp.



The Laser Mast

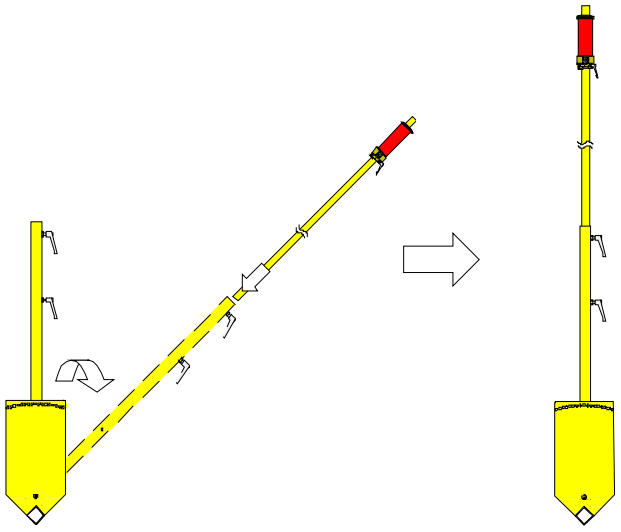
To mount a Laser Receiver a fixed mast, a telescopic mast, or – better – a power mast should be available at the machine.
With a tube diameter of 30 mm to 46 mm a MOBA Laser Receiver can be securely fixed.



Irrespective of the mast type, it has to be ensured that it is positioned vertically in the tool's typical working position.

Ideally, the mast is mounted in an adjustable way to be able to keep the mast upright in variable working positions.
In addition, an adjustable (inclinable) mast serves safety and allows easier handling.

e.g.



The optimal mounting position for a laser mast at the milling machine is at the machine's respective outer face, over the milling drum axis; at the paver it is at the outer screed edge, level with the auger.

The Big Sonic-Ski®

Referring the mounting of the Big Sonic-Ski® your MOBA supplier provides special installation manuals.

7.3 Wiring

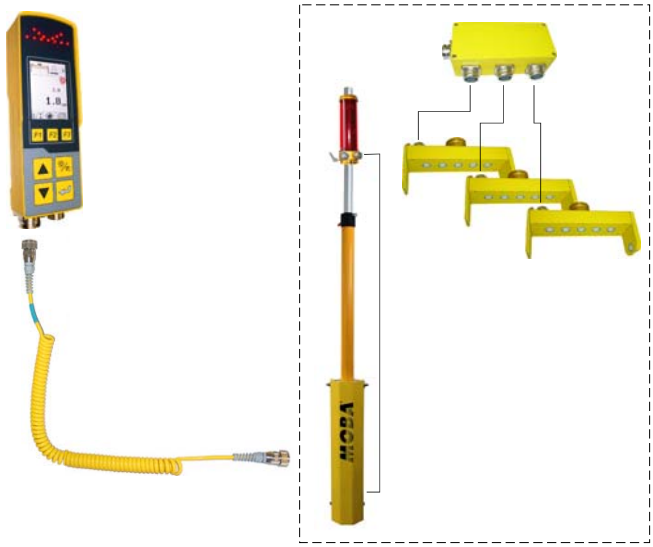
Preface

Also the MOBA-matic II's sensors are connected to the digital controller via the "CAN bus" (**C**ontroller **A**rea **N**etwork) mentioned above.
The bus technology requires terminating resistors.
To make the wiring as easy as possible MOBA already equipped a part of its sensor cables with these terminating resistors.
To differentiate these cables from others the cable coating has been coloured yellow and the cable glands at the plugs are grey.

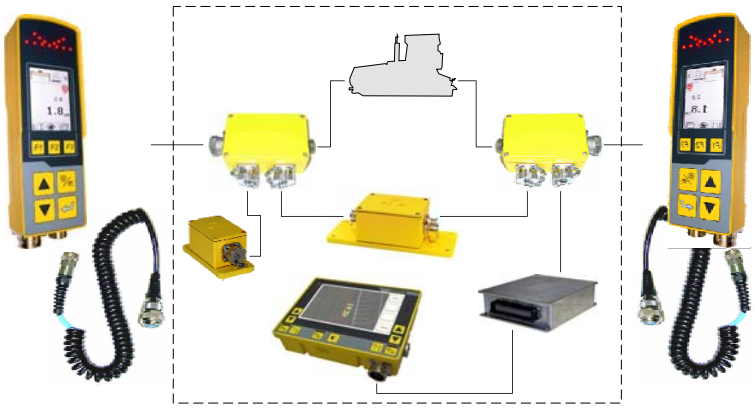
Connect the digital controller's 12-pin plug to the machine's 10-pin plug using a machine connection cable.

Connect the favoured sensor to the digital controller's sensor input.
The cable at the digital controller's (7-pin) sensor input has to be a yellow sensor cable with terminating resistors.

Also in case of segmented sensor constellations (e.g. Big Sonic-Ski®, Power Mast with Laser Receiver) the cable in direct connection to the digital controller's (7-pin) sensor input has to be a yellow sensor cable with terminating resistors.
All further cables in the sensor combination are black standard cables and must not have terminating resistors.



The following scheme shows the wiring of a MOBA 3D system. Via special junction boxes connected to the machine's connection cables and via the Digi-Slope Sensor the left and right control loops are connected to each other.
All cables in the system are black standard cables, since in this constellation the terminating resistors are positioned firmly wired in both junction boxes.
For more detailed information see user manual MOBA 3D.



7.4 Initial operation

In case your machine has been delivered with the MOBA-matic II levelling system, the manufacturer presumably already has commissioned the machine and adjusted the controller parameters to the valves and the machine's hydraulics ex works.
If the system has been installed later please contact your MOBA dealer, who will support you in commissioning the MOBA-matic II.
In this case among others the controller parameters have to be adjusted to the valves and the machine's hydraulics during this procedure.

8 Operation

Preface

The descriptions in this section shall assist you when using the product. This includes

- the safe operation of the product
- full utilisation of the product's potentials
- the economic operation of the product

8.1 Safety instructions

The product may only be operated by trained personnel.

Basics

⚠ WARNING

Risk of injury caused by inappropriate use!
Inappropriate handling of the product can lead to severe personal injuries and material damages.
Therefore: • Have special working processes solely carried out by persons mentioned in the respective sections of this manual.

Only use the product as specified in the section "Conventional use".

8.2 First steps

The section “First steps“ provides you with information on starting-up the system as well as the description of the sensor selection and the display menu.
You also will find instructions on how to navigate within the operator menu and how to set the respective parameters.

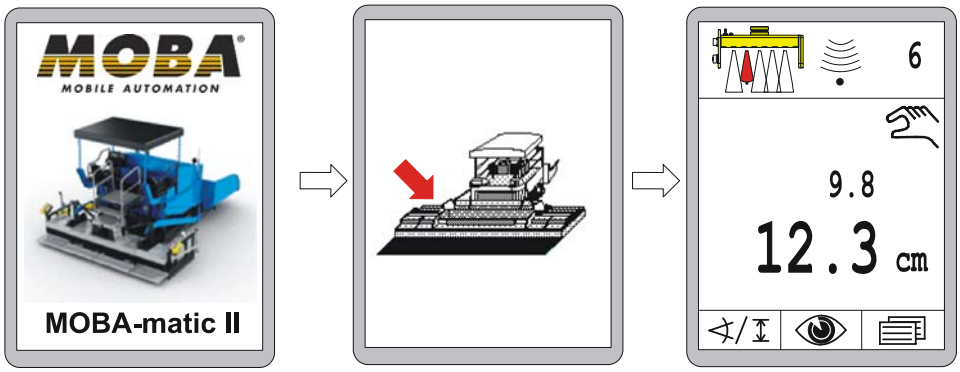
Before starting-up

Before the first start-up the MOBA-matic II has to be visually inspected.
Check all system components referring obvious damages, all cable connections for securely fitted position and all sensors for secure and accurate assembly.
When starting-up the MOBA-matic II ensure that no persons or objects are located in the tool’s area or the range of moving parts for the tool’s control.

8.2.1 Starting-up

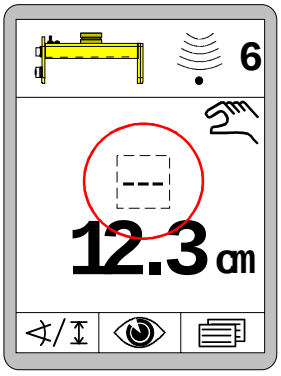
Switch the supply voltage of the MOBA-matic II on.
Depending on the system installation, this can be done by turning the machine’s ignition key or by activating a separate switch on the dashboard.

First a power-on message is displayed for approx. 4 seconds. Then the side detection is displayed for approx. 4 seconds; i.e. a red arrow on the display shows on which machine side the MOBA-matic II is contacted (see central picture).
If the sensor that has been worked with is still connected, the display switches to the working window.

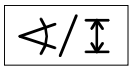


Power-on message | Side detection | Working window

If the sensor last worked with is changed or plugged out the controller indicates this with a symbol in the working window as shown below.
When starting-up the operator shall be informed that the sensor is no longer available.
Choose another sensor or check why the sensor cannot be used.



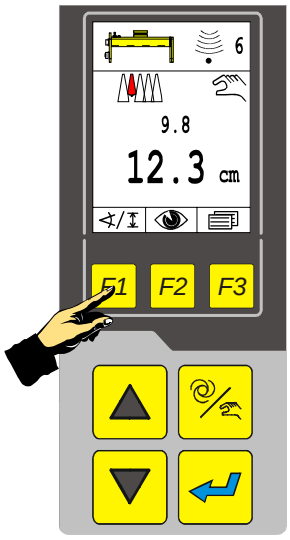
8.2.2 Sensor selection



If the sensor last worked with has been changed or maybe even several sensors have been connected to the MOBA-matic II's CAN bus at the same time, the "Sensor selection" allows to select the respective sensor for the current work project.

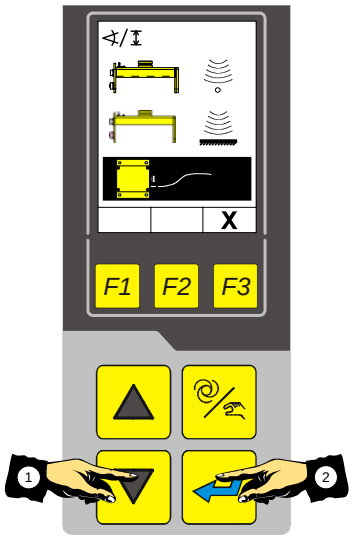
The sensor selection only is available in the operating mode "Manual".

The active sensor is changed as follows:



Press the function key F1 (⊀/↧) in the working window.

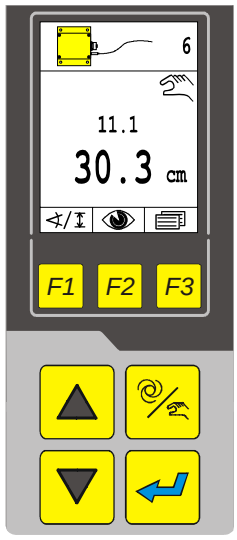
- The sensor selection window opens.
- The symbol ⊀/↧ appears at the window's top left.



Select another sensor with the Up/Down keys ①.
In case more sensors are connected than fit on the display, the system automatically scrolls on.

- The selection is indicated in black.

Acknowledge selection with the Enter key ②.

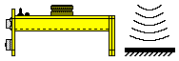


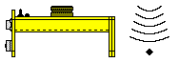
The new sensor is ready to use.

Overview sensor symbols

In a maximum equipped system the following sensors can be used:

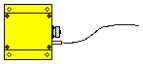
No sensor

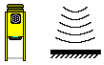

Sonic-Ski® plus *SKIS-1500* for ground sensing


Sonic-Ski® plus *SKIS-1500* for string line sensing

Digi-Slope Sensor *SLOS-0150*

Digi-Rotary Sensor *ROTS-0300*


Wire-Rope Sensor *ROPS-0900*

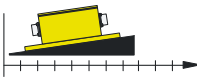

Dual-Sonic Sensor *DUAS-1000*

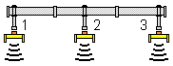
Proportional Laser Receiver *LS-3000*

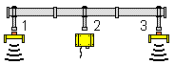
5 Channel Laser Receiver

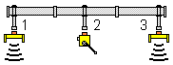
Proportional Laser Receiver with Power Mast *ETM-900*

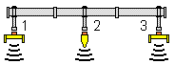
5 Channel Laser Receiver with Power Mast *ETM-900*

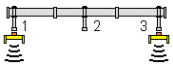

Path-dependent cross slope control

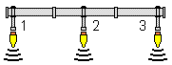

Big Sonic-Ski® from *SKIS* / *SKIS* / *SKIS*

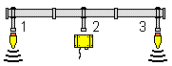

Big Sonic-Ski® from *SKIS* / *ROPS* / *SKIS*

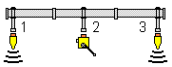

Big Sonic-Ski® from *SKIS* / *ROTS* / *SKIS*

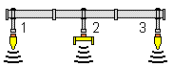

Big Sonic-Ski® from *SKIS* / *DUAS* / *SKIS*

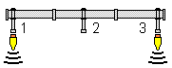

Big Sonic-Ski® from *SKIS* / *n.c.* / *SKIS*

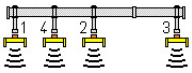

Big Sonic-Ski® from *DUAS* / *DUAS* / *DUAS*


Big Sonic-Ski® from *DUAS* / *ROPS* / *DUAS*


Big Sonic-Ski® from *DUAS* / *ROTS* / *DUAS*


Big Sonic-Ski® from *DUAS* / *SKIS* / *DUAS*


Big Sonic-Ski® from *DUAS* / *n.c.* / *DUAS*



Quad Big Sonic-Ski®

3D GNSS

3D TPS

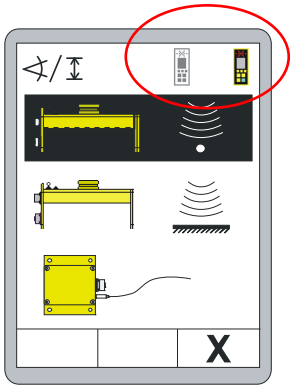
3D GNSS/TPS Slope

Side detection

With the following symbols at the display's top right the MOBA-matic II shows at which machine side it currently is connected.

MOBA-matic II connected at left side

MOBA-matic II connected at right side



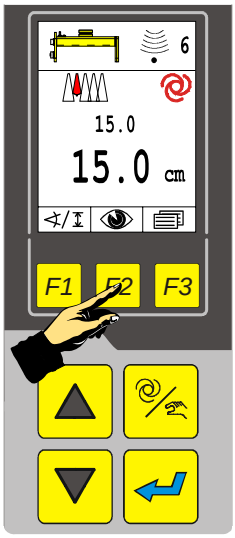
8.2.3 Display menu

While working with any sensor the measured values of all other sensors connected to the MOBA-matic II's CAN bus can be viewed without having to stop controlling.

Also the layer thickness is shown in the display menu, if the system has been equipped with the required sensors and the display of the layer thickness has been activated in the configuration menu. (Also see section "Configuration menu".)

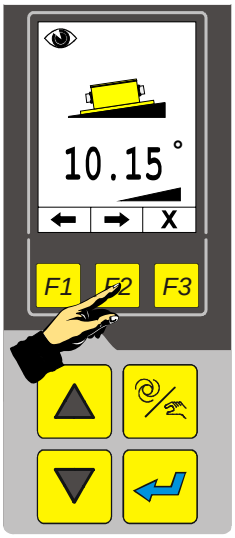
The display menu is available in the operating mode "Manual" as well as in the operating mode "Automatic".

View the measured values of the other sensors as follows:

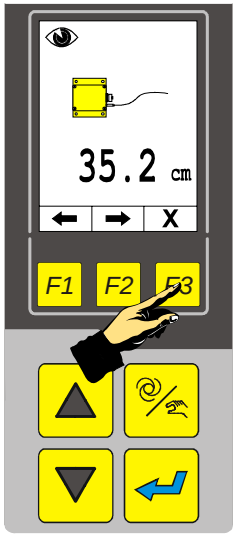


Press the function key F2 (👁) in the working window.

- The display window opens.
- The symbol 👁 appears at the window's top left.



With the function keys F1 (⬅) and F2 (➡) navigate through the menu and view the currently measured values of all connected sensors.



Press function key F3 (**X**) to quit the display menu.

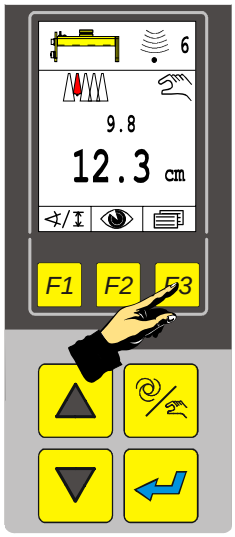
8.2.4 Operator menu

In the digital controller's operator menu important parameters and setting options referring the MOBA-matic II's adjustment and the control's behaviour are compiled.

The operator menu is available in the operating mode "Manual" as well as in the operating mode "Automatic".

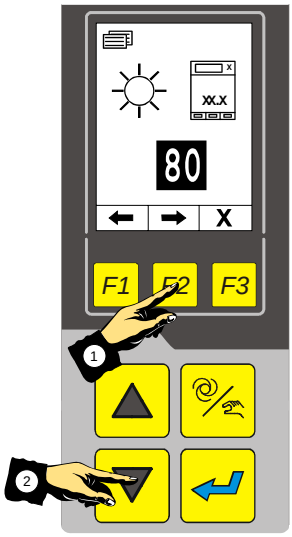
Generally applying for working with the operator menu:
Values are set by pressing any function key, a selection is taken over by pressing the Enter key.

Settings in the operator menu are changed as follows:



Press function key F3(🗐) in the working window.

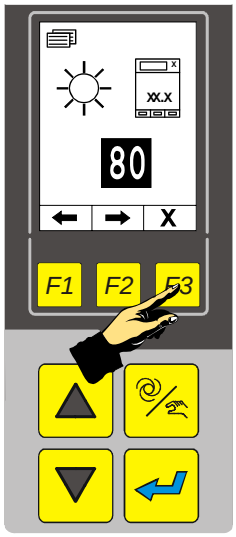
- The operator menu opens.
- The symbol 🗐 appears at the window's top left.



Navigate through the operator menu with the function keys F1 (⬅) and F2 (➡) ①.

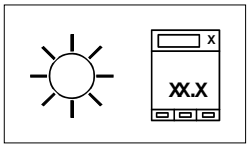
Carry out adjustments with the Up/Down keys ②.

CAUTION! By pressing any function key the new settings are taken over.



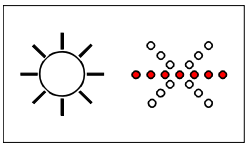
Press function key F3 (**X**), to quit the operator menu.

The operator menu's parameters in detail:



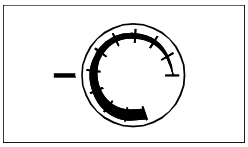
Brightness of display
The brightness of the display background lighting can be set to allow appropriate readability even during poor lighting conditions.

By pressing the Enter key in this window the keyboard lighting can be switched on and off.



Brightness LED arrow
Also the LED arrow's brightness can be adjusted individually.
To simplify the process the complete LED arrow is actuated as long as the menu point is being called up.

By pressing the Enter key in this window the keyboard lighting can be switched on and off.



Sensibility
The parameter "Sensibility" determines how long and how drastically the control reacts to deviations.
The setting range is from 1 (low sensibility) to 10 (high sensibility).
The numerical values hold an expedient combination of the control parameters "Dead band" and "Prop band" emerging from long test series.
You will find the value tables on the next pages.
The sensibility value can be set separately for each sensor type and later is automatically loaded when a sensor is changed.

If the MOBA-matic II works unsteadily in automatic mode the sensibility of the respective digital controller has to be reduced. If the MOBA-matic II works sluggishly in automatic mode the sensibility of the respective digital controller has to be increased.

Your MOBA dealer may change the digital controller's standard settings in a way that instead of the parameter "Sensibility" the hidden control parameters "Dead band" and "Prop band" are blended in. These then can be individually adjusted by trained personnel.

Sensibility tables for proportional valves and servo valves:

Sensibility	Dead band (mm)	Prop band (mm)
1.0	4.0	90.0
2.0	3.6	80.3
3.0	3.2	70.7
4.0	2.8	61.0
5.0	2.4	51.3
6.0	2.1	41.7
7.0	1.7	32.0
8.0	1.3	22.3
9.0	0.9	12.7
10.0	0.5	3.0

Dual-Sonic Sensor, Sonic-Ski® plus, Big Sonic-Ski®, prop. Laser Receiver and Power-Mast with Laser Receiver

Sensibility	Dead band (mm)	Prop band (mm)
1.0	3.0	80.0
2.0	2.7	71.4
3.0	2.3	62.9
4.0	2.0	54.3
5.0	1.7	45.8
6.0	1.3	37.2
7.0	1.0	28.7
8.0	0.7	20.1
9.0	0.3	11.6
10.0	0.0	3.0

Wire-Rope and Digi-Rotary Sensor

Sensibility	Dead band (%)	Prop band (%)
1.0	0.25	4.00
2.0	0.22	3.61
3.0	0.19	3.22
4.0	0.17	2.83
5.0	0.14	2.44
6.0	0.11	2.06
7.0	0.08	1.67
8.0	0.06	1.28
9.0	0.03	0.89
10.0	0.00	0.50

Digi-Slope Sensor

Sensibility tables for switching operation:

Sensibility	Dead band (mm)	Prop band (mm)
1	5.0	18.0
2	4.0	16.0
3	3.6	14.0
4	3.4	12.0
5	3.0	10.0
6	2.4	8.0
7	2.0	6.0
8	1.6	5.0
9	1.2	4.0
10	1.0	3.0

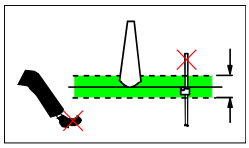
Dual-Sonic Sensor, Sonic-Ski® plus, Big Sonic-Ski®, prop. Laser Receiver and Power-Mast with Laser Receiver

Sensibility	Dead band (mm)	Prop band (mm)
1	4.0	18.0
2	3.4	16.0
3	3.0	14.0
4	2.4	12.0
5	2.0	10.0
6	1.4	8.0
7	1.0	6.0
8	0.8	5.0
9	0.6	4.0
10	0.4	3.0

Wire-Rope and Digi-Rotary Sensor

Sensibility	Dead band (%)	Prop band (%)
1	0.40	1.60
2	0.30	1.40
3	0.20	1.20
4	0.14	1.00
5	0.10	0.80
6	0.06	0.60
7	0.04	0.50
8	0.02	0.40
9	0.02	0.30
10	0.00	0.20

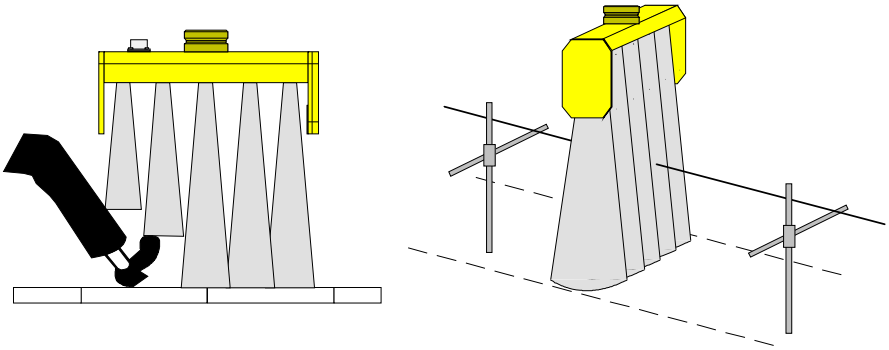
Digi-Slope Sensor



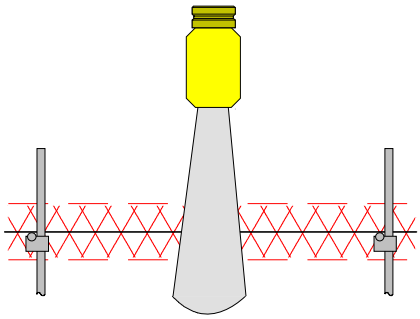
Control window

This menu point only is shown in case a grade sensor has been currently selected as active sensor, since it only affects this sensor type.

Out of several reasons the measured value of a sensor may change erratically. This can be due to the operating personnel's inadvertence (obstacles in a sonic sensor's sound beam, overrun string line holders, etc.) as well as technical errors (torn reference rope, etc.).

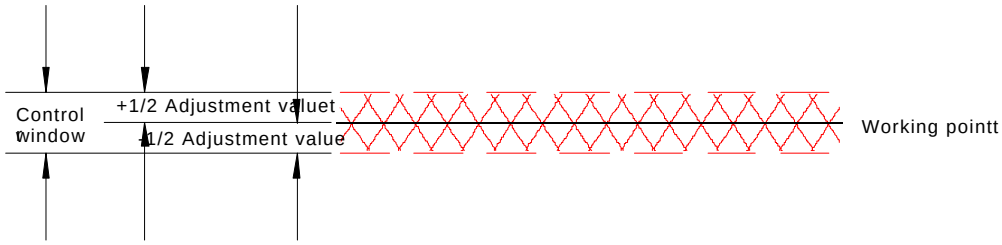


To avoid these undesired measurement errors and resulting extreme control reactions of the machine the measured values of all grade sensors can be embedded in a so-called "control window".



In case an occurring control deviation is higher than the set range this deviation is detected as an error.
The display then shows the warning symbol "measured value out of control window", the complete LED arrow flashes and the hydraulic cylinder's actuation is switched off.

The size of the control window positioned symmetrically around the working point is adjustable.
Depending on which physical unit has been set for the grade measurements, the setting is done in 0.1 cm, 0.1 inch or 0.01 feet steps.
The control window's set value specifies a range around the working point; i.e. half an adjustment value lies above and half an adjustment value lies below the working point.
(Example: 6 cm working window = +/- 3 cm around the working point)



The function "Working window" can be deactivated.
To do so adjust the value until, instead of a numerical value, the crossed out symbol of the working window appears in the display.

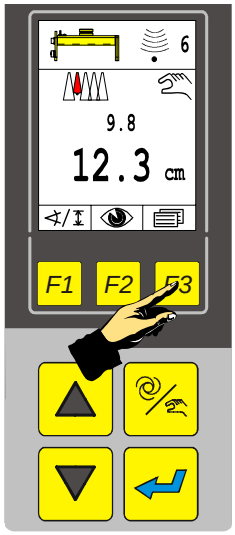
Hydraulic data record
If the MOBA-matic II should be used in several machines trained specialised personnel can deposit hydraulic parameter settings for up to X different machine types (the hydraulic records' maximum number can be limited by your MOBA dealer at the initial setting).
Via this menu point the saved settings then have to be loaded for the respective machine.

A change of the hydraulic data record directly affects the control. It is possible that with a different data record your machine's control works insufficiently or not at all – therefore only change if you are absolutely sure.
If the hydraulic data record is changed when the system is in "Automatic" mode it is automatically switched to "Manual".

8.2.4.1 Configuration menu

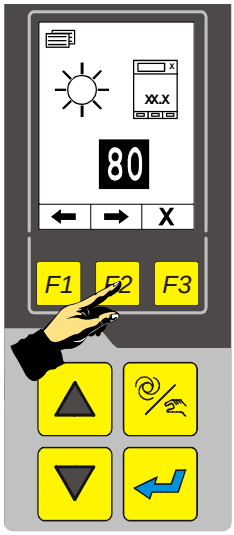
The configuration menu is part of the operator menu.
Here the display of the layer thickness is activated and configured (in case possible due to sensor constellation) and the sensors‘ physical units as well as the display’s look are determined.

Settings in the configuration menu are changed as follows (Example: physical unit of the slope measurements):

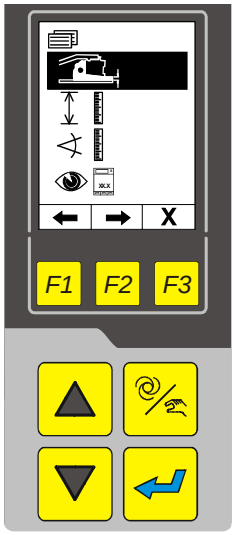


Press function key F3 (▤) in the working window.

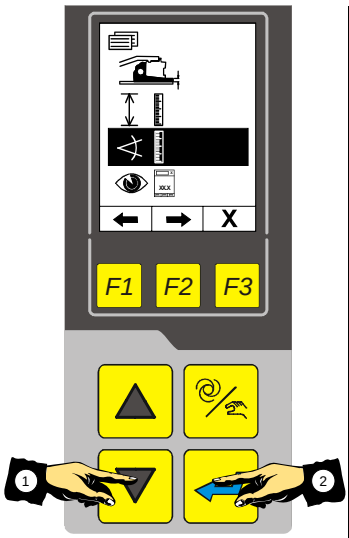
- The operator menu opens.
- The symbol ▤ appears at the window’s top left.



With the function keys F1 (⬅) and F2 (➡) navigate through the operator menu ...

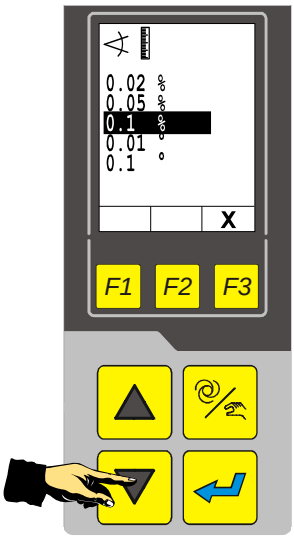


... and switch to the configuration menu.



Select the favoured menu point [here: „Physical unit of the slope measurement“ (∢)] with the Up/Down keys ①.

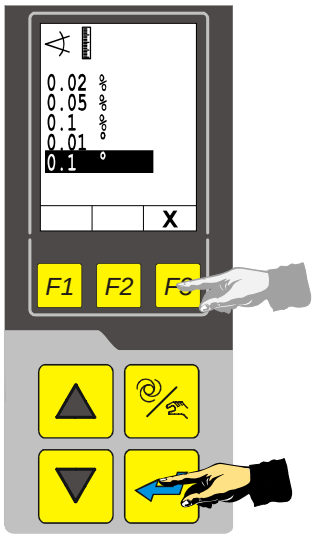
Acknowledge with the Enter key ②.



- The respective symbol [here: (∢)] appears at the top left of the window.
- The currently valid setting is marked.

Change the selection with the Up/Down keys.

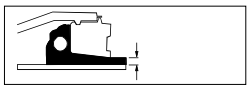
In case more sensors are connected than fit on the display, the system automatically scrolls on.



Acknowledge with the Enter key.

Press function key (**X**) to quit the current selection menu any time <u>without</u> changes.

The configuration menu points in detail:

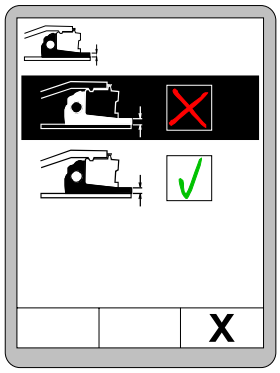


The MOBA-matic II has been prepared for layer thickness display. Basic functions are given. However, the determined values cannot always be used unlimitedly without additional distance information.

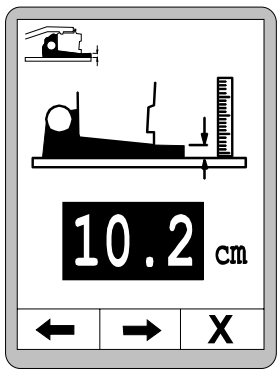
Layer thickness display

The menu point “Layer thickness display“ in the configuration menu is only blended in if, in dependence of the current sensor constellation at the CAN bus, it is possible to display the layer thickness.

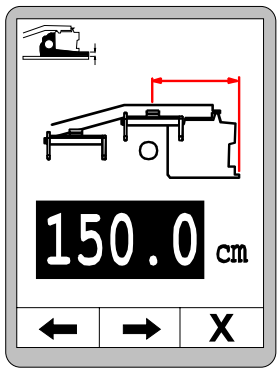
First determine if you wish to activate or deactivate the layer thickness display.



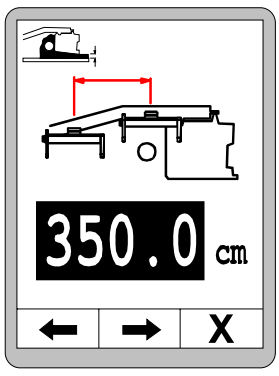
In case the layer thickness display has been activated it is indispensable to enter the following parameters for the correct calculation of the value:



Currently measured layer thickness.

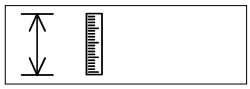


Distance from the screed’s rear edge to the first sensor’s centre.



Distance from the first sensor’s centre to the second sensor’s centre.

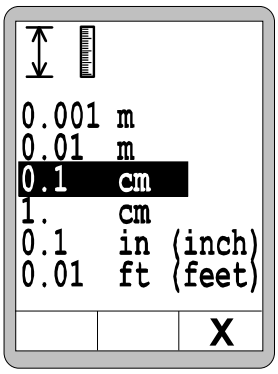
Check layer thickness display during ongoing operation and where applicable optimise the first parameter “Currently measured layer thickness”.

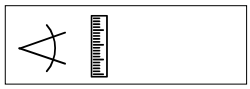


Resolution and physical unit for distance measurements

Choose the resolution and the physical unit for the distance measurements from the offered alternatives.

The choice made is valid for all sensors used for distance measurements.

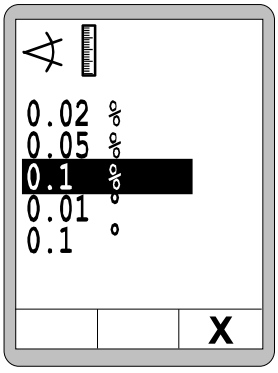


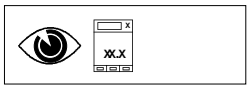


Resolution and physical unit for slope measurements

Choose the resolution and the physical unit for the slope measurements from the offered alternatives.

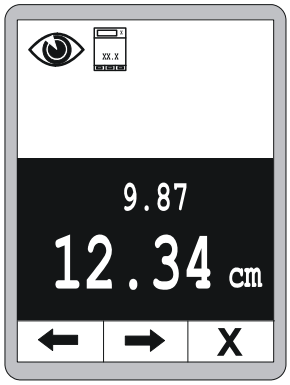
The choice made is valid for all sensors used for slope measurements.



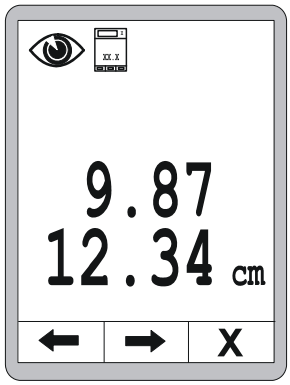


The working window's look

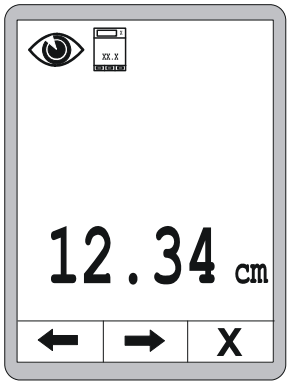
From the offered alternatives choose the working window's look; via the Up/Down keys, i.e. the display formats of the actual value and the set point.



Standard view:
Actual value small
Set point big



Actual value big
Set point big

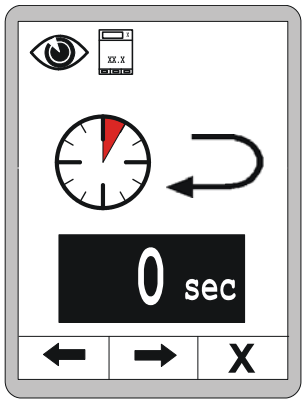


Classic view:
Operating mode "Manual" = only actual value
Operating mode "Automatic" = only set point

Auto return:

By pressing the function key F2 a time-defined return from the submenus to the main menu can be set in the next parameter.
The time range is 0-10 sec.

0 = no return
>0 = time until return

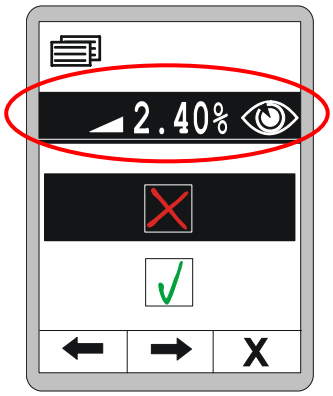


By default 0 sec. are set.

8.2.4.2 Info line

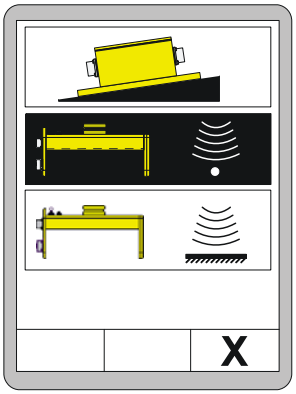
The info line provides additional information shown in the normal operation menu.

Decide whether the info line is blended in or not.



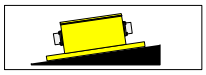
In case you have activated the info line, you can choose the information to be displayed from the automatically opening selection menu.

In the following the selectable variables of the info line are shown.

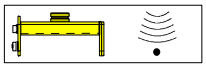


Overview info line

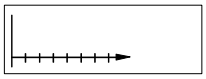
The following values can be selected for the info line:



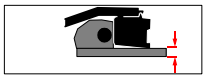
Actual value of the Digi-Slope Sensor (= Default)



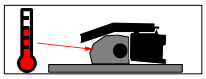
Actual values of all currently connected other sensors, e.g. the Sonic-Ski®



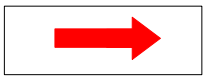
Covered distance of the machine
(in case distance sensor connected)



Actual value of the layer thickness measuring
(in case sensors connected, and active)



Actual value of the material temperature
(in case sensor connected)

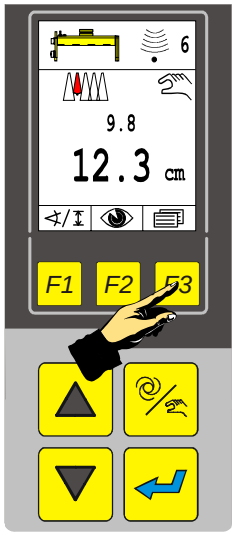


Actual value of the levelling sensor currently active at the other side
(in case machine is fully wired)

8.2.5 Switch on keyboard lighting

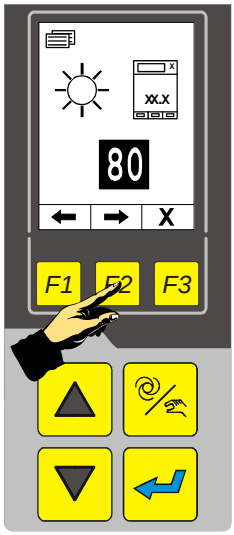
The MOBA-matic II's keyboard is lit to allow easy operation during unfavourable lighting conditions.

The keyboard lighting is switched on or off as follows:

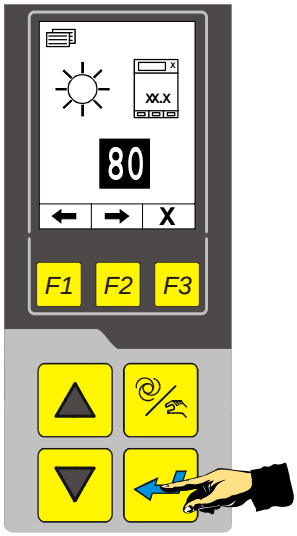


Press the function key F3 (🗐) in the working window.

- The operator menu opens.
- The symbol 🗐 appears at the window's top left.



With the function keys F1 (⬅) and F2 (➡) either navigate to the menu point "Brightness of display" or to "Brightness LED arrow".



Press the Enter key and this way switch the keyboard lighting on or off.

8.2.6 Refittings

When changing sensors, conducting settings or installations or working at the sensors always switch the MOBA-matic II to the operating mode “Manual“.

8.2.7 Power-down

Out of safety reasons the digital controller always starts up in the operating mode “Manual“, even if the system had been switched to the operating mode “Automatic“ before the power-down.
Nevertheless, always switch the MOBA-matic II to the operating mode “Manual“ when leaving the machine.
During longer working breaks and at the end of the working day the voltage supply has to be disconnected and the system has to be deinstalled or reliably protected against restart.

8.3 Working with the Digi-Slope Sensor

8.3.1 Adjustment of the actual value

Definition

When assembling, the Digi-Slope Sensor should be positioned parallel to the tool's bottom edge. Since this cannot always be achieved to one hundred percent and a gap may occur at times, the sensor is subsequently adjusted in the system.
After the "offset" between the measured value und the real value has been detected the Digi-Slope Sensor precisely displays the tool's slope. We call this the adjustment of the actual value.

The actual value's adjustment has to be carried out first when commissioning the Digi-Slope sensor.
For ideal working results the actual value's display has to be frequently checked and as the case may be corrected.
A new adjustment of the actual value generally has to be carried out in case…

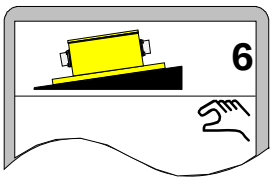
- *the Digi-Slope Sensor has been changed*
- *the Digi-Slope Sensor's installation position has been changed*
- *there have been mechanical changes at the tool or its holding fixture.*

The following example describes how to adjust the numerical value of a set slope target to the result's actual value while working in automatic mode.

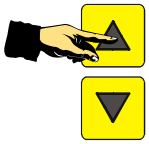
1) With the Auto / Manual key switch the controller to the operating mode "Manual".

2) Select the *Digi-Slope Sensor* as described above.

- The display shows the sensor symbol and the symbol for "Manual".

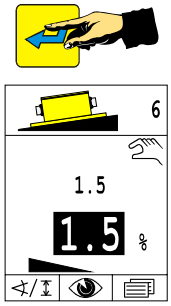


3) For the zero adjustment put the tool to working position by pressing the UP / DOWN keys at the controller or the machine's operating unit.



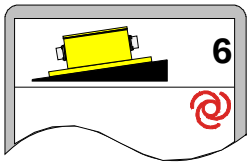
4) Press the Enter key.

- The set point is coloured black and the current actual value is adopted as set point (here: 1.5 % to the right).



5) With the Auto / Manual key switch to the operating mode “Automatic“.

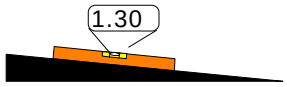
- The controller keeps the tool positioned at the set value.



6) Pave a few metres with the set slope.

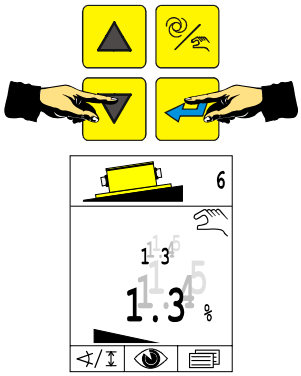
Remeasure the results with a high-precise water-level.

- In our example this actually detected slope value is 1.3 %.



7) Press and hold the Enter key.

Also press the UP or the DOWN key and correct both displayed values to the slope value determined in step 6.



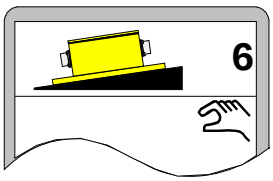
8) Where applicable, repeat steps 6 and 7 until the set set point equals the installed slope.

8.3.2 Controlling with the Digi-Slope Sensor

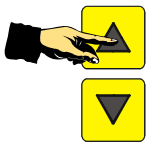
1) With the Auto / Manual key switch the controller to the operating mode “Manual”.

2) Select the *Digi-Slope Sensor* as described above.

- The display shows the sensor symbol and the symbol for “Manual”.

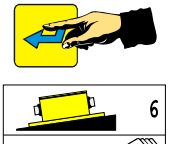


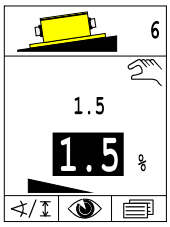
3) For the zero adjustment put the tool to working position by pressing the Up/Down keys at the controller or the machine’s operating unit.



4) Press Enter key.

- The set point is coloured black and the current actual value is adopted as set point.

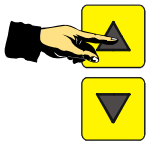




5) With the Auto / Manual key switch to the operating mode “Automatic“.

- The controller keeps the tool positioned at the set value.

6) In automatic mode the set point can be changed via the Up/Down keys to carry out corrections.



8.4 Zero adjustment

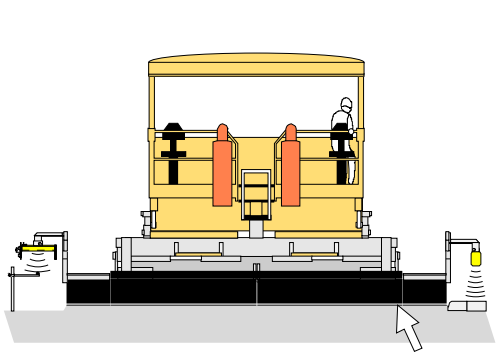
Before describing operations with the various grade sensors, the term “zero adjustment” has to be defined.

For every new work project or after mounting or remounting a grade sensor, the current value measured by the sensor has to be adjusted to zero.
In doing so, the current mounting level of the grade sensor above the reference is saved in the system and a clear reference value is provided for all future target points at the same time.
We call this procedure **zero adjustment**.

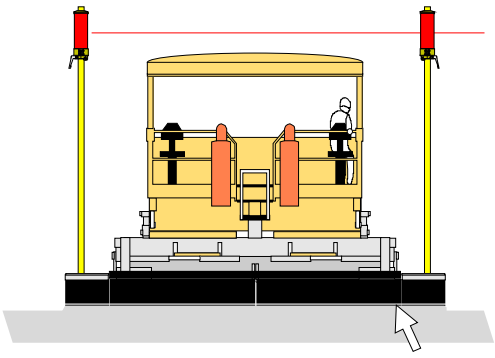
To do so:

1) Manually position the tool’s bottom edge at adjustment height; i.e. at the level that is relevant for the upcoming work project (layer thickness, milling depth, level of the plane to be paved, etc.).

2) Position the grade sensor(s) above the reference.
In case working with laser receivers use the provided positioning aid to shift them in a way that the laser beam hits the receiver’s centre.
Please consider the individual specifications of the various sensors, which are described in the respective section ”Assembly and setting”.



Adjustment height



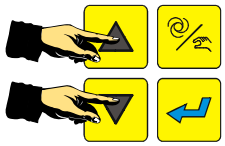
Adjustment height

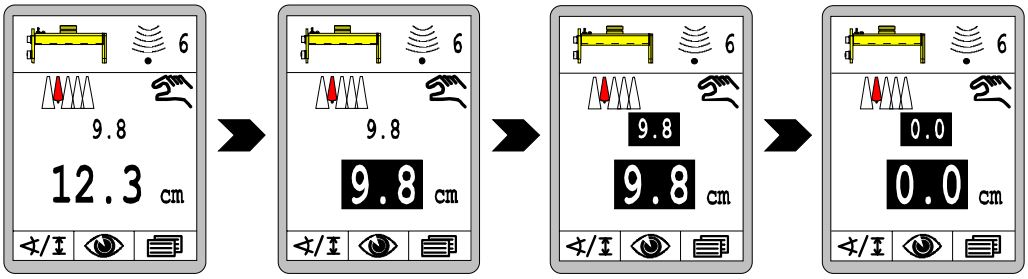
The zero adjustment only takes effect in grade sensors, when the digital controller is in the operating mode “Manual“.

When the tool and the sensor(s) have been set to the adjustment height the zero adjustment should be carried out as follows:

3) From the digital controller’s sensor selection choose the grade sensor to be adjusted.

4) Simultaneously press and hold the digital controller’s UP and DOWN key until the actual value and the set point are coloured black in the display and after approx. 2 seconds both switch to“0.0“.





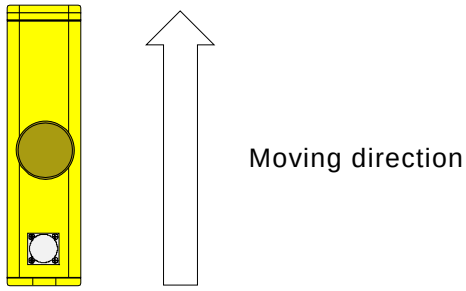
The current value measured by the grade sensor (actual value) has been adopted as set point und both values have been assigned 0.0. There is no control deviation.

8.5 Working with the Sonic-Ski® plus

8.5.1 Assembly and setting

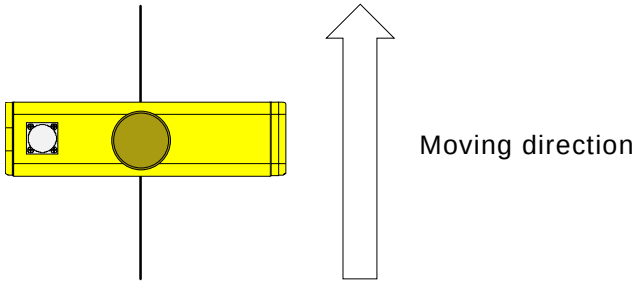
Assembly direction Ground sensing

When ground sensing the Sonic-Ski® plus has to work lengthwise to the machine's moving direction (averaging).

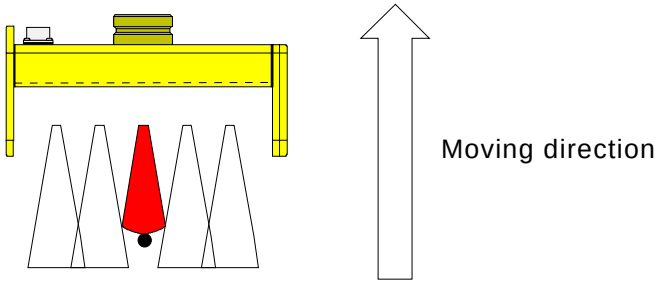


Assembly direction String line sensing

When string line sensing the Sonic-Ski® plus has to work crosswise to the machine's moving direction. Position the sensor centrally over the string line.



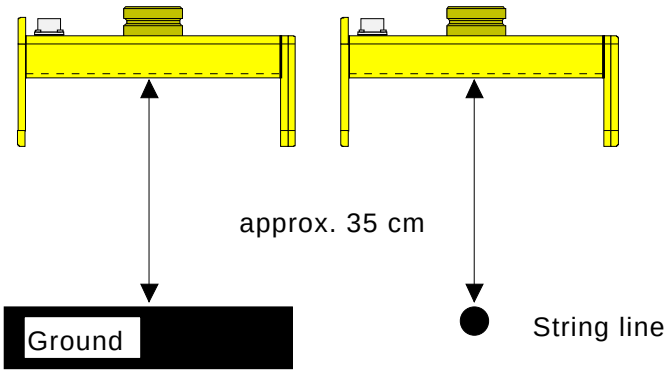
To make sure that the string line under the sensor heads of the Sonic-Ski® plus is correctly displayed for each side the sensor has to be mounted at both sides as shown in the sensor symbol; i.e. with the connection plug pointing left (as seen in moving direction).



Solely string lines with a diameter of 3 mm and more are detected as reference.

Working range

The Sonic-Ski® plus‘s ideal working range for ground and string line sensing is between 30 cm and 40 cm.
In this range the actual value is steadily shown in the display, out of this range the display blinks (positioning aid).
The Sonic-Ski® plus should be adjusted with approx. 35 cm to the reference.

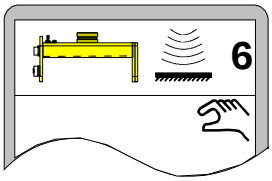


8.5.2 Controlling with theSonic-Ski® plus when ground sensing

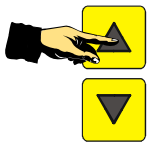
1) With the Auto / Manual key switch the controller to the operating mode “Manual”.

2) Select the sensor *Sonic-Ski® plus for ground sensing* as described above.

- The display shows the sensor symbol and the symbol for “Manual”.



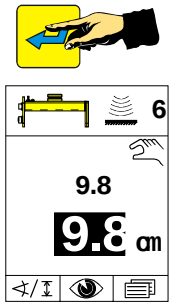
3) For the zero adjustment put the tool to working position by pressing the Up/Down keys at the controller or the machine’s operating unit.



4) Adjust the sensor over the reference as described in the section “Assembly and setting“.

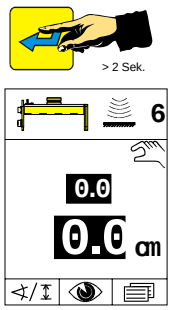
5a) Press the Enter key.

- The set point is coloured black and the current actual value is adopted as set point.



5b) Hold the Enter key for approx. 2 sec.

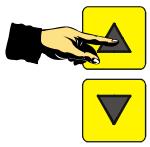
- The actual value <u>and</u> the set point first are coloured black.
- The actual value a<u>nd</u> the set point are assigned “0.0”.



6) With the Auto / Manual key switch to the operating mode “Automatic“.

- The controller keeps the tool positioned at the set value.

7) In automatic mode the set point can be changed via the Up/Down keys to carry out corrections.

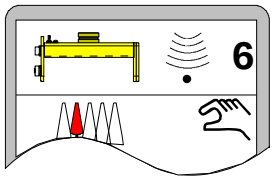


8.5.3 Controlling with the Sonic-Ski® plus when string line sensing

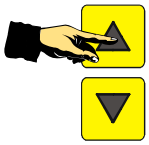
1) With the Auto / Manual key switch the controller to the operating mode “Manual”.

2) Select the sensor *Sonic-Ski® plus for string line sensing* as described above.

- The display shows the sensor symbol and the symbol for “Manual”.



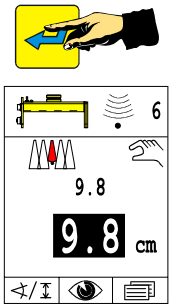
3) For the zero adjustment put the tool to working position by pressing the Up/Down keys at the controller or the machine’s operating unit.



4) Adjust the sensor over the reference as described in the section “Assembly and setting“.

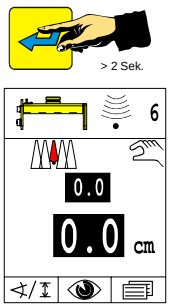
5a) Press the Enter key.

- The set point is coloured black and the current actual value is adopted as set point.



5b) Hold the Enter key for approx. 2 sec.

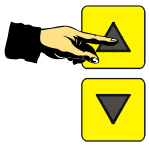
- The actual value and the set point first are coloured black.
- The actual value and the set point are assigned “0.0”.



6) With the Auto / Manual key switch to the operating mode “Automatic“.

- The controller keeps the tool positioned at the set value.

7) In automatic mode the set point can be changed via the Up/Down keys to carry out corrections.



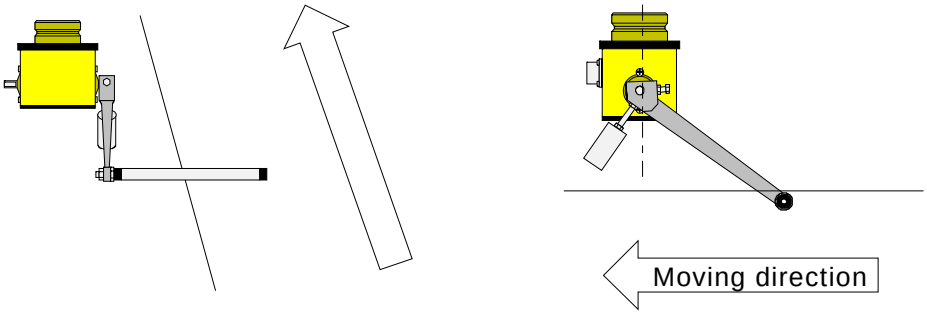
8.6 Working with the Digi-Rotary Sensor

8.6.1 Assembly and setting

The Digi-Rotary Sensor “trails“ the sensing arm with the attached auxiliary device.
Two different auxiliary devices are available for sensing.
The Digi-Rotary Sensor’s height should be set in a way that, with overlying sensing tube or sensing ski, the flattened side of the sensor axis is vertical to the reference. This position creates the perfect angle for transducing. (Also see pictures below.)

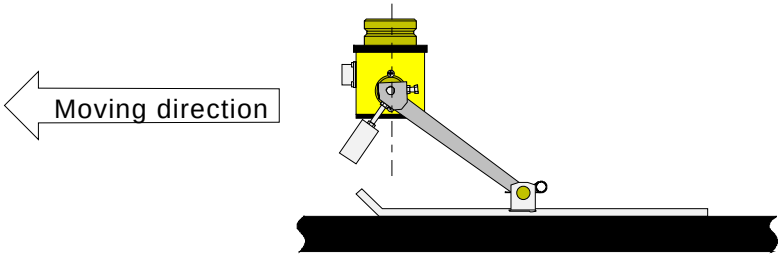
String line sensing

When string line sensing the sensing tube is used.
By turning in or out adjust the counter weight in a way that the sensing tube applies a slight pressure from above on the string line.
In case the tension of the string line used as reference is too low, the sensing tube can be positioned under the string line. To do so the counter weight’s setting has to allow the sensing tube to slightly press against the string line from below.



Ground sensing

When ground sensing the sensing ski is used.
By turning in or out adjust the counter weight in a way that the sensing tube applies a slight pressure on the reference.

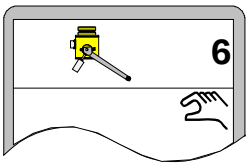


8.6.2 Controlling with the Digi-Rotary Sensor

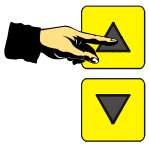
1) With the Auto / Manual key switch the controller to the operating mode “Manual”.

2) Select the *Digi-Rotary Sensor* as described above.

- The display shows the sensor symbol and the symbol for “Manual”.



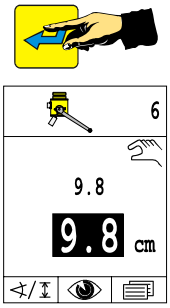
3) For the zero adjustment put the tool to working position by pressing the Up/Down keys at the controller or the machine’s operating unit.



4) Adjust the sensor over the reference as described in the section “Assembly and setting“.

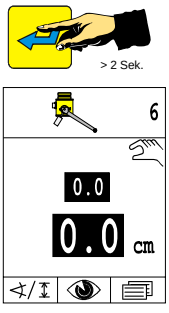
5a) Press the Enter key.

- The set point is coloured black and the current actual value is adopted as set point.



5b) Hold the Enter key for approx. 2 sec.

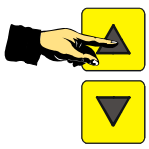
- The actual value and the set point first are coloured black.
- The actual value and the set point are assigned “0.0”.



6) With the Auto / Manual key switch to the operating mode “Automatic“.

- The controller keeps the tool positioned at the set value.

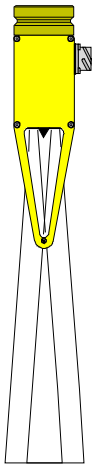
7) In automatic mode the set point can be changed via the Up/Down keys to carry out corrections.



8.7 Working with the Dual-Sonic Sensor

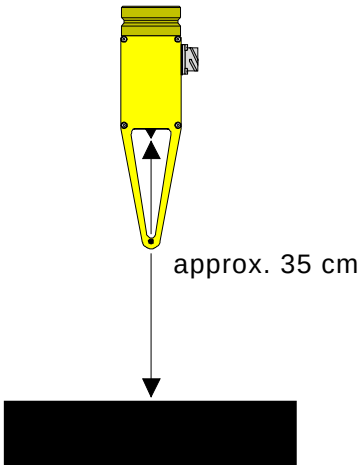
8.7.1 Assembly and setting

The ultrasonic pulses emitted from the Dual-Sonic Sensor have a conic form, i.e. the higher its distance to the sensor, the wider the sound beam.
Due to this, when working with the Dual-Sonic Sensor a tolerance of > 20 cm has to be maintained around the sound beam axes to reliably avoid disturbing reflections in the complete specified working range.



Working range

The Dual-Sonic Sensor's ideal working range is between 30 cm and 40 cm.
The Dual-Sonic Sensor should be set with a distance of approx. 35 cm to the reference.

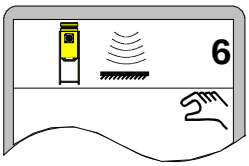


8.7.2 Controlling with the Dual-Sonic Sensor

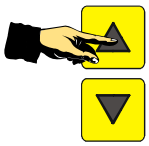
1) With the Auto / Manual key switch the controller to the operating mode “Manual”.

2) Select the *Dual-Sonic Sensor* as described above.

- The display shows the sensor symbol and the symbol for “Manual”.



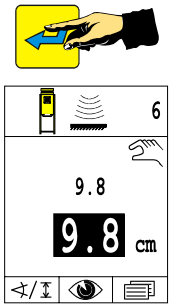
3) For the zero adjustment put the tool to working position by pressing the Up/Down keys at the controller or the machine’s operating unit.



4) Adjust the sensor over the reference as described in the section “Assembly and setting“.

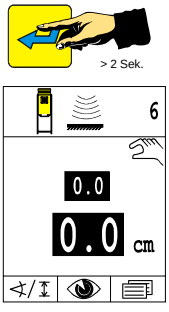
5a) Press the Enter key.

- The set point is coloured black and the current actual value is adopted as set point.



5b) Hold the Enter key for approx. 2 sec.

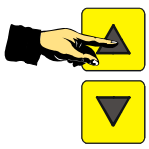
- The actual value <u>and</u> the set point first are coloured black.
- The actual value <u>and</u> the set point are assigned “0.0”.



6) With the Auto / Manual key switch to the operating mode “Automatic“.

- The controller keeps the tool positioned at the set value.

7) In automatic mode the set point can be changed via the Up/Down keys to carry out corrections.

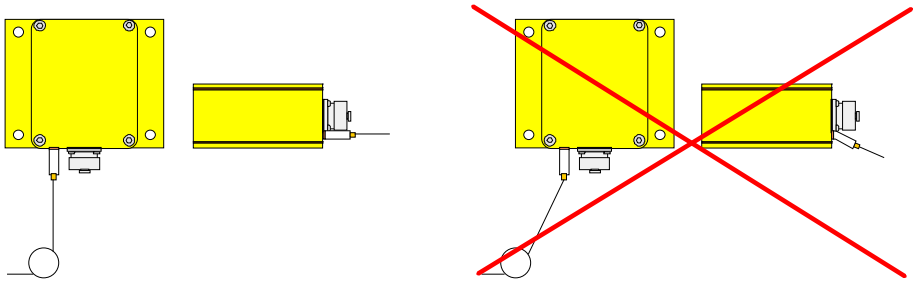


8.8 Working with the Wire-Rope Sensor

8.8.1 Assembly and setting

The Wire-Rope Sensor‘s rope should individually be fixed in a way that a working range as wide as possible can be provided for the planned application.

Horizontally as well as vertically the rope has to enter or exit the sensor rectangularly.

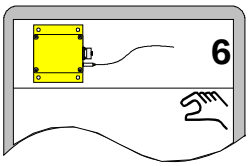


8.8.2 Controlling with the Wire-Rope Sensor

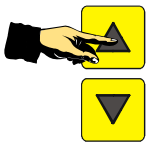
1) With the Auto / Manual key switch the controller to the operating mode “Manual”.

2) Select the *Wire-Rope Sensor* as described above.

- The display shows the sensor symbol and the symbol for “Manual”.



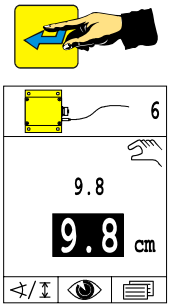
3) For the zero adjustment put the tool to working position by pressing the Up/Down keys at the controller or the machine’s operating unit.



4) Adjust the sensor over the reference as described in the section “Assembly and setting“.

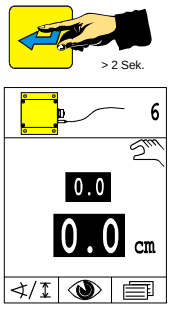
5a) Press the Enter key.

- The set point is coloured black and the current actual value is adopted as set point.



5b) Hold the Enter key for approx. 2 sec.

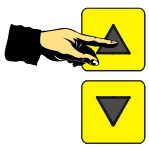
- The actual value <u>and</u> the set point first are coloured black.
- The actual value <u>and</u> the set point are assigned “0.0”.



6) With the Auto / Manual key switch to the operating mode “Automatic“.

- The controller keeps the tool positioned at the set value.

7) In automatic mode the set point can be changed via the Up/Down keys to carry out corrections.



8.9 Working with the Big Sonic-Ski®

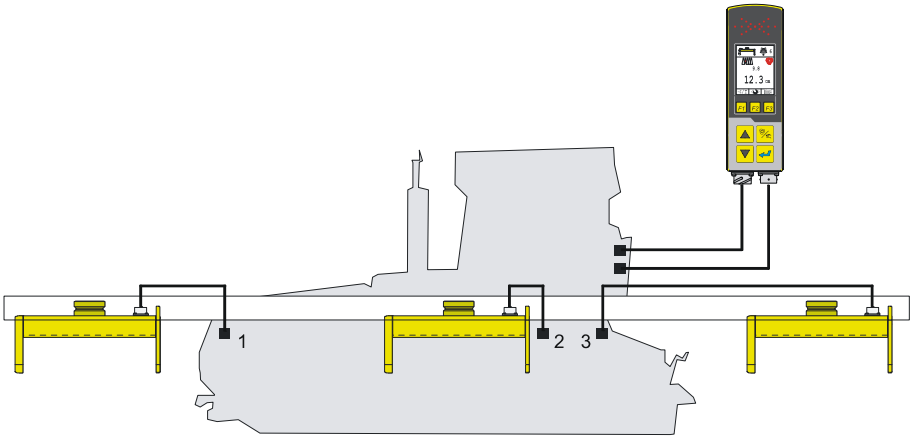
8.9.1 Assembly and setting

Mechanic installation

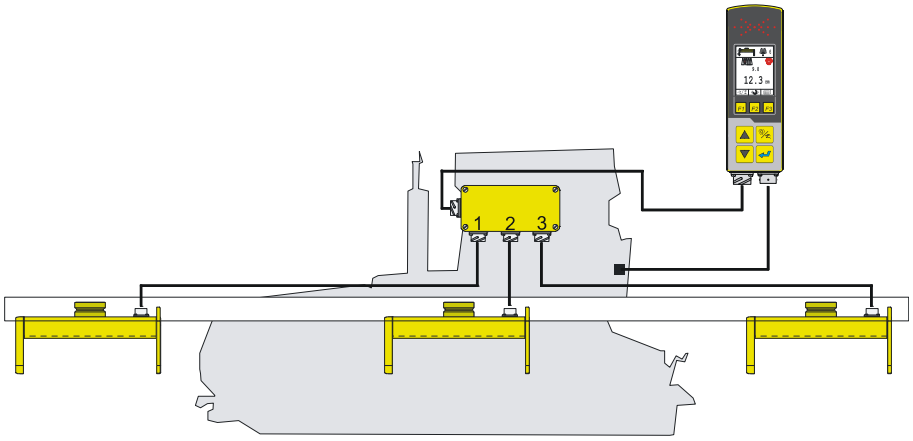
Your MOBA dealer will provide you with installation instructions which describe the assembly of the Big Sonic-Ski®'s mechanical parts in detail. (Also see section "Related documents".)

Electronic installation

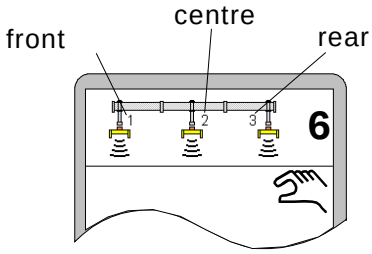
In machines with a CAN bus wired ex works the connection of 3 sensors to create a Big Sonic-Ski® is no problem, since respectively coded connection plugs normally are provided in the front, in the centre and in the back of these machines' side walls.



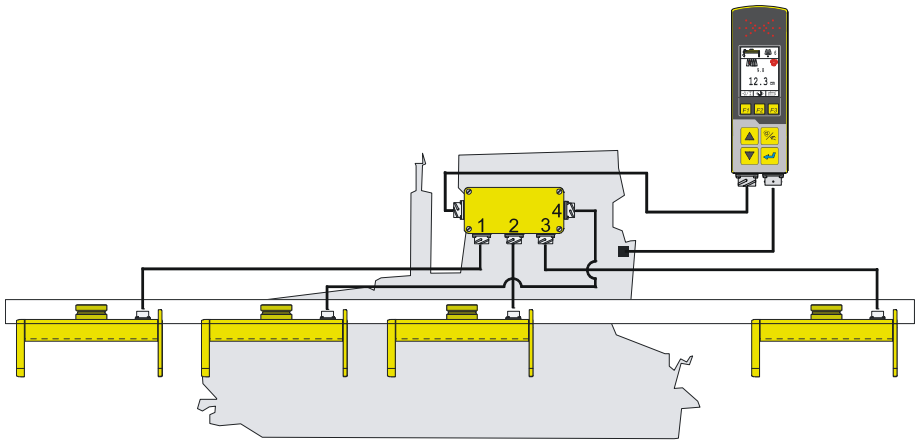
Connecting the Big Sonic-Ski® to a machine that has not been featured with a CAN bus wired ex works is more complex.
In this case the 3 sensors are connected via a special "Big Sonic-Ski® junction box" with respectively coded connection plugs.



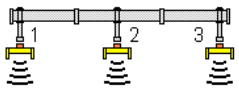
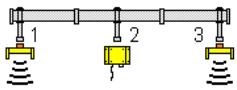
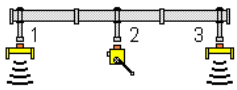
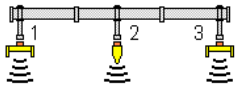
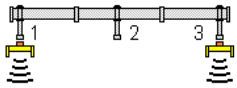
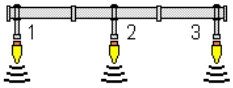
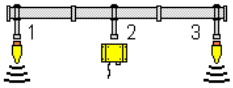
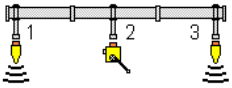
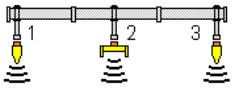
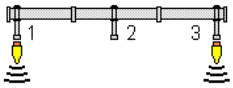
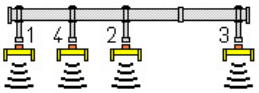
Always connect the sensor at first position in moving direction to output 1, the central sensor to output 2 and the rear sensor to output 3 of the “Big Sonic-Ski® junction box“.
The sensor’s numbering in the sensor symbols also refers to this connection sequence.



In case a Big Sonic-Ski® with 4 Sonic-Ski® plus sensors should be used, the additional sensor has to be connected to output 4 of the ”Big Sonic-Ski® Junction box“.
For this application the fourth sensor is mounted centrically between the first and the second sensor (also see the following drawing).



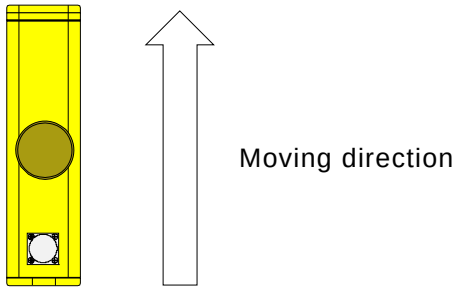
In the following find an overview of the permissible Big Sonic-Ski® constellations.
In the sensor selection menu solely options possible with the currently assembled sensors can be chosen.

 *SKIS / SKIS / SKIS*	 *SKIS / ROPS / SKIS*	 *SKIS / ROTS / SKIS*
 *SKIS / DUAS / SKIS*	 *SKIS / n.c. / SKIS*	
 *DUAS / DUAS / DUAS*	 *DUAS / ROPS / DUAS*	 *DUAS / ROTS / DUAS*
 *DUAS / SKIS / DUAS*	 *DUAS / n.c. / DUAS*	
 *Quad Big Sonic-Ski®*		

At the positions 1 and 3 – i.e.in front and at the back of the machine - only identical ultrasonic sensors are permissible.

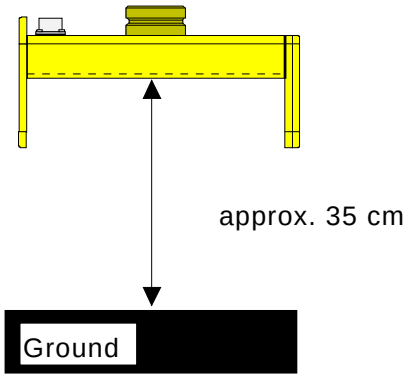
Assembly direction of the Sonic-Ski® plus Sensors

The Big Sonic-Ski® can only be used for ground sensing. Therefore all Sonic-Ski® plus have to be aligned lengthwise to the machine's moving direction (averaging).



Working range Ultrasonic sensors

Also when working with the Big Sonic-Ski® the ultrasonic sensor's ideal working range has to be considered.
Every ultrasonic sensor used should be set with a distance of approx. 35 cm to the reference.

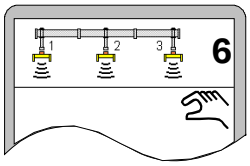


8.9.2 Controlling with the Big Sonic-Ski®

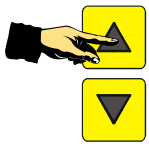
1) With the Auto / Manual key switch the controller to the operating mode “Manual”.

2) Select one of the possible *Big Sonic-Ski®* constellations as described above.

- The display shows the sensor symbol and the symbol for “Manual”.



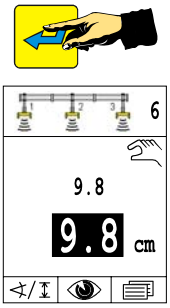
3) For the zero adjustment put the tool to working position by pressing the Up/Down keys at the controller or the machine’s operating unit.



4) Adjust all Big Sonic-Ski® Sensors over the reference as described in the section “Assembly and setting“.

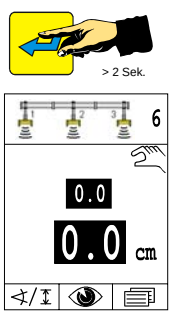
5a) Press the Enter key.

- The set point is coloured black and the current actual value is adopted as set point.



5b) Hold the Enter key for approx. 2 sec.

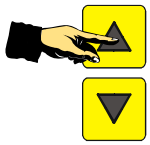
- The actual value <u>and</u> the set point first are coloured black.
- The actual value <u>and</u> the set point are assigned “0.0”.



6) With the Auto / Manual key switch to the operating mode “Automatic“.

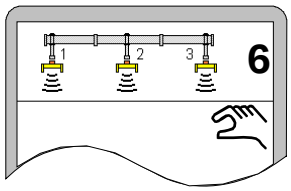
- The controller keeps the tool positioned at the set value.

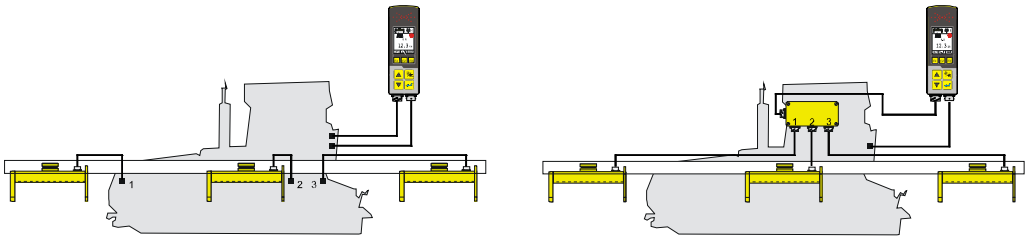
7) In automatic mode the set point can be changed via the Up/Down keys to carry out corrections.



8.9.3 Quick sensor change

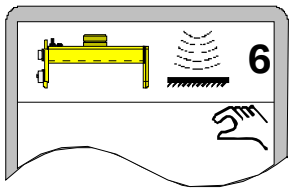
In case the Big Sonic-Ski® has been selected as active sensor the user may switch between the ski combination (averaging) from all 3 sensors and the evaluation of a single sensor with only one keystroke.

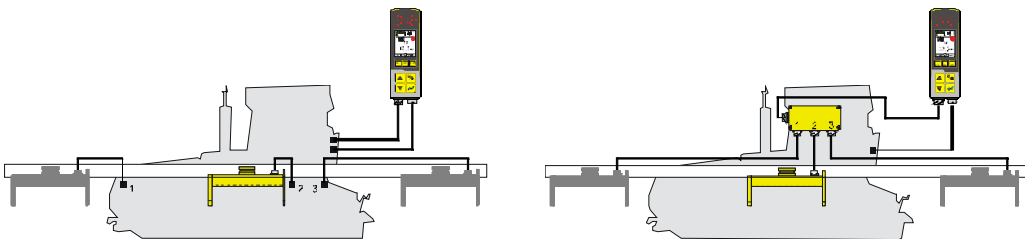




To do so simultaneously press the digital controller's Up/Down keys in the operating mode "Manual".

After the keystroke solely the measurement signal of the sensor connected at the Big Sonic-Ski®'s middle position is evaluated. The sensor's operation and display then relates to the description in the section "Working with the…" in this manual.

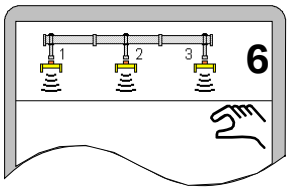


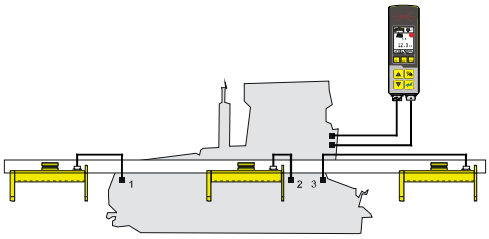


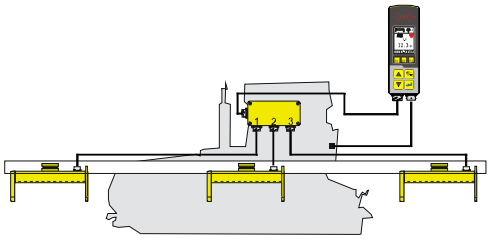
This function for example simplifies adjusting the Big Sonic-Ski® over a reference when starting a work project; in case a suitable sensing field is not available for all sensors yet.

Simultaneously press the digital controller's Up and Down key in the operating mode "Manual" again to return to the Big Sonic-Ski® function.

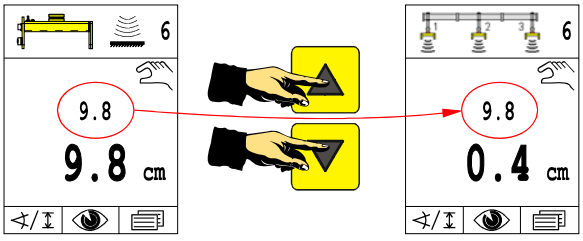
With this keystroke the measurement signals of all 3 sensors connected to the Big Sonic-Ski® are averaged again.







When switching from single sensor evaluation to Big Sonic-Ski® the single sensor's actual value is automatically adopted as actual value for the Big Sonic-Ski®.



When switching vice versa from Big Sonic-Ski® to single sensor evaluation the single sensor's value is <u>not</u> adjusted; i.e. there may be a change of the actual value.

8.10 Working with the proportional Laser Receiver

8.10.1 Security instructions

Laser beams

⚠ CAUTION

Risk of eye injuries caused by laser beams!

Laser transmitters work with highly intense light beams. Looking directly into the laser beam can lead to eye injuries.

Therefore:
- Do not directly look into the laser beam.
- Do not level the laser beam at a person's eyes.
- Operate the laser emitter considerably over eye height.

Inappropriate assembly

⚠ CAUTION

Risk of injury caused by inappropriate assembly!

Laser transmitters and laser receivers occasionally have to be assembled in considerable height over ground. An assembly with improper auxiliary devices can cause injuries.

Therefore:
- Do not climb up the machine and the mast.
- To mount the laser transmitter onto a tripod and the laser receiver onto the mast use proper auxiliary devices (e.g. stepladder) and undertake safety precautions.

8.10.2 Assembly and setting

Preface

When assembling the Laser Receiver following points have to be implicitly observed:

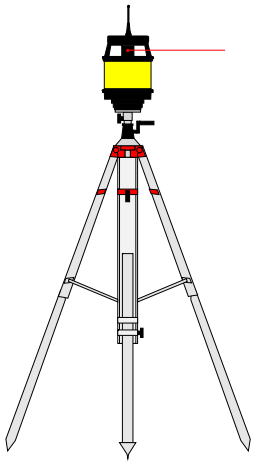
- No obstructions (e.g. cables) are allowed in front of the sensor;
- The laser transmitter and receiver have to always be in “clear view” to each other;

  Ideally, they are both mounted high enough to let the rotating laser beam stride over the machine roof without being obstructed.
- No reflecting surfaces (windows, vehicle windows, etc.) are allowed near the laser beam;

  To minimize reflection it is advisable to shield off the laser transmitter from all but the circular sectional view actually needed.
- The specified range of the laser transmitter may not be exceeded (pay attention to environmental influences).

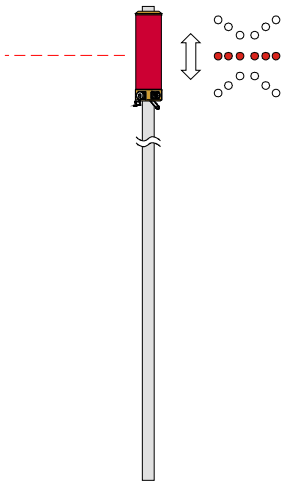
Working point

Considering its user manual, put a suitable laser transmitter (wave length between 600 and 1030 nm) into operation at sufficient height.



Put the mast at which the laser receiver has been mounted to in an upright position.

The proportional laser receiver is freely shiftable on its mast.
To set the laser receiver use the provided positioning aid and shift the sensor and the mast respectively in a way that the laser beam centrally hits the reception area.
(Also see section “The display elements of the proportional Laser Receiver“.)
Only this way the set point subsequently can be changed in the full range of +/- 14 cm.



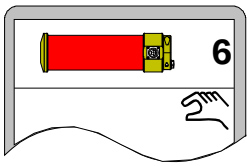
In principle the working point can be adopted at any position of the laser receiver.
Depending on the planned application this can even be expedient.
With an asymmetrically positioned working point the available adjustment range of one direction (raise or lower) is increased while the other is decreased.

8.10.3 Controlling with the proportional Laser Receiver

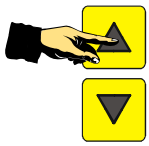
1) With the Auto / Manual key switch the controller to the operating mode “Manual”.

2) Select the *Laser Receiver* as described above.

- The display shows the sensor symbol and the symbol for “Manual”.



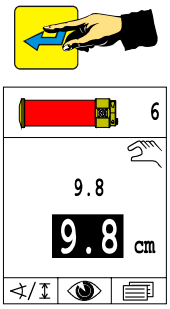
3) For the zero adjustment put the tool to working position by pressing the Up/Down keys at the controller or the machine’s operating unit.



4) Adjust the laser receiver centrically to the reference as described in the section “Assembly and setting“.

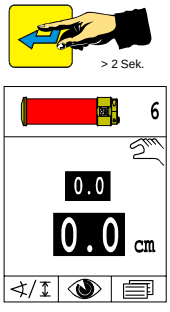
5a) Press the Enter key.

- The set point is coloured black and the current actual value is adopted as set point.



5b) Hold the Enter key for approx. 2 sec.

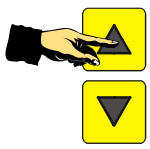
- The actual value and the set point first are coloured black.
- The actual value and the set point are assigned “0.0”.



6) With the Auto / Manual key switch to the operating mode “Automatic“.

- The controller keeps the tool positioned at the set value.

7) In automatic mode the set point can be changed via the Up/Down keys to carry out corrections.



8.11 Working with the Power Mast and the proportional Laser Receiver

8.11.1 Safety instructions

Electric current

⚠ DANGER

Risks caused by electric current!

When working with the laser mast or the power mast next to electric systems e.g. overhead powerlines or electric railways, there is danger to life due to electric shock.

Therefore:
- Keep sufficient safety distance to electric systems. If working at such systems is indispensable, inform the responsible authorities before starting the working process and follow their instructions.

Laser beams

⚠ CAUTION

Risk of eye injuries caused by laser beams!

Laser transmitters work with highly intense light beams. Looking directly into the laser beam can lead to eye injuries.

Therefore:
- Do not directly look into the laser beam.
- Do not level the laser beam at a person's eyes.
- Operate the laser emitter considerably over eye height.

Inappropriate assembly

⚠ CAUTION

Risk of injury caused by inappropriate assembly!

Laser transmitters and laser receivers occasionally have to be assembled in considerable height over ground. An assembly with improper auxiliary devices can cause injuries.

Therefore:
- Do not climb up the machine and the mast.
- To mount the laser transmitter onto a tripod and the laser receiver onto the mast use proper auxiliary devices (e.g. stepladder) and undertake safety precautions.

8.11.2 Assembly and setting

Preface

When working with a power mast and an assembled laser receiver the following points have to be implicitly observed:

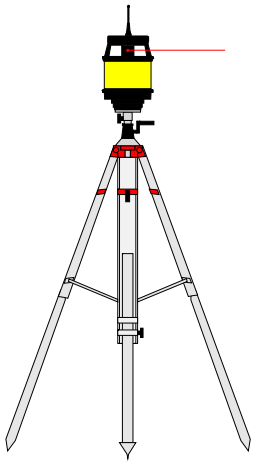
- No obstructions (e.g. cables) are allowed in front of the sensor;
- The laser transmitter and receiver have to always be in “clear view” to each other;

  Ideally, they are both mounted high enough to let the rotating laser beam stride over the machine roof without being obstructed.
- No reflecting surfaces (windows, vehicle glazing, etc.) are allowed near the laser beam;

  To minimize reflection it is advisable to shield off the laser transmitter from all but the circular sectional view actually needed.
- The specified range of the laser transmitter may not be exceeded (pay attention to environmental influences).

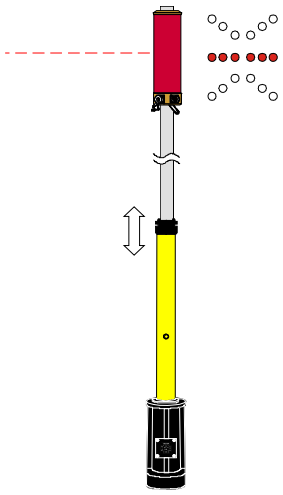
Working point

Considering its user manual, put a suitable laser transmitter (wave length between 600 and 1030 nm) into operation at sufficient height.



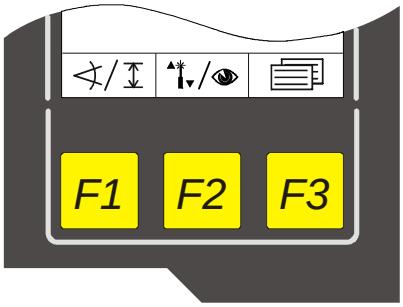
Put the mast at which the laser receiver has been mounted to in an upright position.
Turn the laser receiver to a position at which the positioning aid’s LEDs are clearly visible from the digital controller.

When working with a power mast the laser receiver can be set in 2 different ways.
Both can easily be carried out with the digital controller.
1) The mast can be driven manually and the laser receiver can be set with its positioning aid or
2) the search for the laser beam can be done automatically.
(Also see the next section “The mast menu“.)

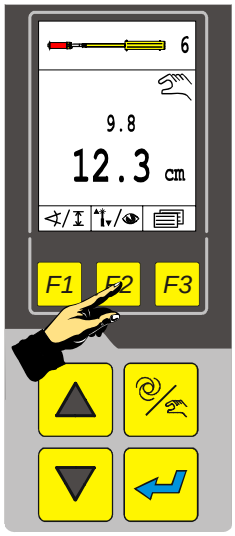


8.11.3 The mast menu

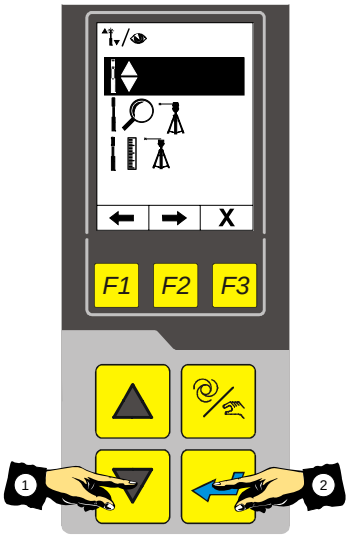
When the power mast and the laser receiver have been selected as active sensor, helpful additional functions are available.
These additional functions are called up from the working window via the function key F2.
As long as the power mast and the laser receiver are selected, the working window shows a slightly different symbol over the function key F2, pointing out the extended appliance.



Calling up the mast menu

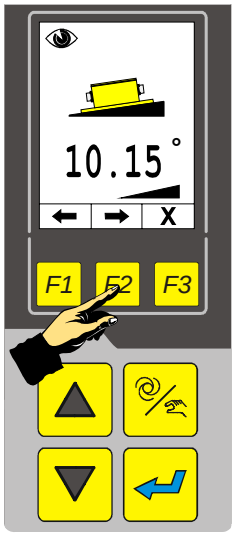


Press the function key F2 (⇅/👁) in the working window.



- The mast menu window opens.
- The symbol ⇅/👁 appears at the window's top left.

With the Up/Down keys select the favoured menu point ① and acknowledge the selection with the Enter key ② ...

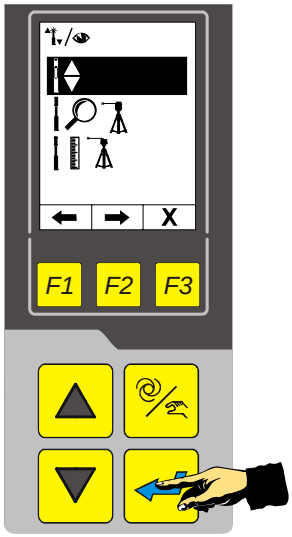


... or via the function key F2 (➡) change to the already familiar display menu with the currently measured values of all connected sensors.

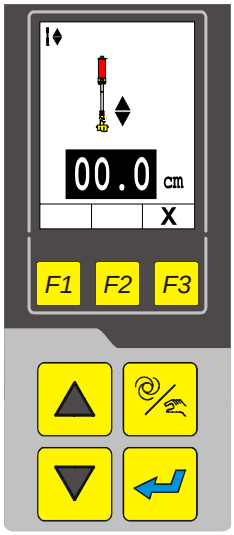
- The symbol 👁 appears at the window's top left.

The mast menu's functions are described on the following pages.

Move the power mast manually



In the mast menu select the function “Move power mast manually“



- The window pictured above opens.
- The symbol appears in the window’s top left.

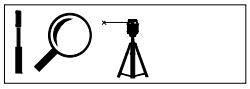
Move the mast with the Up/Down keys e.g. to set the laser receiver with the help of the positioning aid.

Value shown in the display = mast length

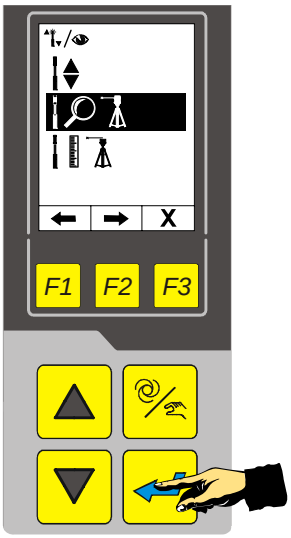
= Move power mast out

= Move power mast in

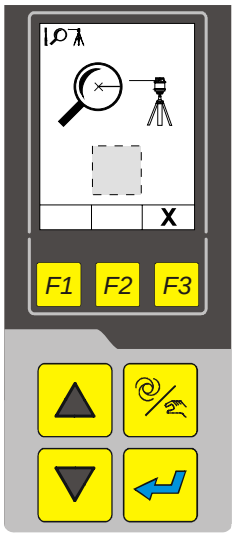
= Move the entire power mast in automatically



Automatic laser beam search



Select the function “Automatic laser beam search“ in the mast menu.



- The window pictured above opens.
- The symbol appears in the window’s top left.

With the Up/Down keys start the automatic laser beam search. The mast stops when the laser beam centrically hits the laser receiver.

= Search from current position upwards

= Search from current position downwards

= Search upwards first (automatic switch of search direction)

At the grey rectangle’s position one of the following symbols is shown:

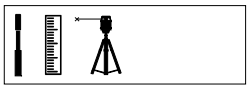
= at the call up

= during search upwards

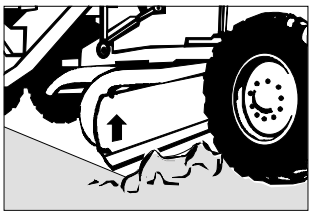
= during search downwards

= laser beam found

= laser beam not found



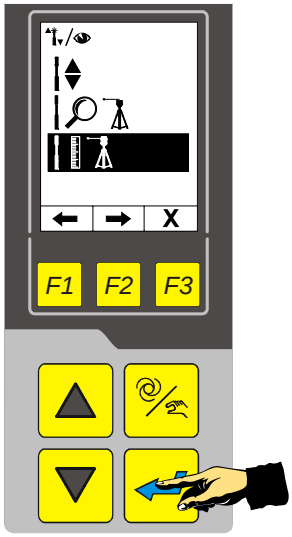
Height measurements with power mast and laser receiver



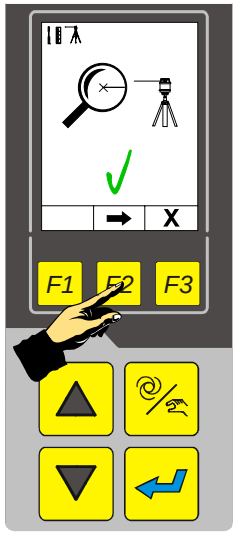
Put the tool to the transport position with the Up key or with the machine's operating unit and fix this position.

It has to be ensured that the tool's distance to the ground is sufficient even when crossing highly uneven terrain.

Place the machine at a suitable position on the area to be measured.



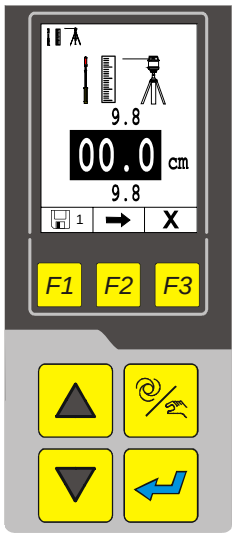
Select the function "Height measurements" in the mast menu.



- The window pictured above opens.
- The symbol appears in the window's top left.

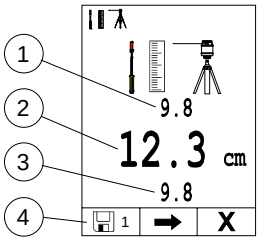
Carry out the automatic laser beam search as described on the previous side.

When the laser beam has been found (green check mark in the display) press the function key F2.

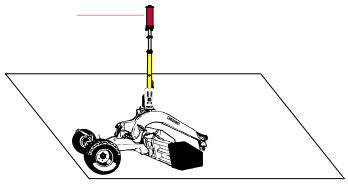


Adjust the power mast by pressing the Enter key for more than 2 seconds.

When adjusting, the data storage is automatically deleted.



1) Max. measured value
2) Current measured value
3) Min. measured value
4) Storage space

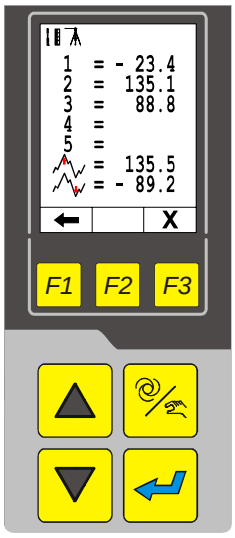


Drive over the area to be measured.
At every position the MOBA-matic II adjusts the power mast in a way that the laser beam always hits the laser receiver centrically.
For every position the power mast's current measured value (actual value) is shown on the display.

Save the measured value at significant positions by pressing the function key F1 (💾 x).

Max. 5 storage spaces are available (number next to the disk symbol).

After the measure-ments have been completed press the function key F2 (➡).



The display lists the previously saved measured values.
In addition, the highest and the lowest measured value are shown.

= Highest measured value

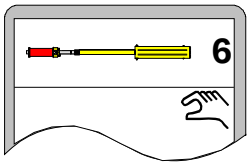
= Lowest measured value

8.11.4 Controlling with the Power Mast and the proportional Laser Receiver

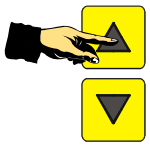
1) With the Auto / Manual key switch the controller to the operating mode “Manual”.

2) Select *Power-Mast with Laser Receiver* as described above.

- The display shows the sensor symbol and the symbol for “Manual”.



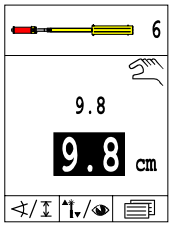
3) For the zero adjustment put the tool to working position by pressing the Up/Down keys at the controller or the machine’s operating unit.



4) Adjust the power mast with the laser receiver centrically to the reference as described in the section “Assembly and setting“.

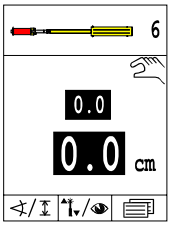
5a) Press the Enter key.

- When the laser beam is at any position in the laser receiver’s reception range the power mast is moved in a way that the laser beam centrically hits the laser receiver.
- The set point is coloured black and the current actual value is adopted as set point.



5b) Hold the Enter key for approx. 2 sec.

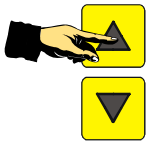
- The actual value and the set point first are coloured black.
- The actual value and the set point are assigned “0.0”.



6) With the Auto / Manual key switch to the operating mode “Automatic“.

- The controller keeps the tool positioned at the set value.

7) In automatic mode the set point can be changed via the Up/Down keys to carry out corrections.



8.12 Working with the 3D TPS

8.12.1 Assembly and setting

Put the MOBA 3D TPS system into operation corresponding to its user manual.

Describing the assembly, wiring and configuration of the system components – detecting the machine dimensions and recording them in the 3D software – calibrating the mast slope sensor - and above all the description of the 3D software's functions would be going beyond the scope of this manual.

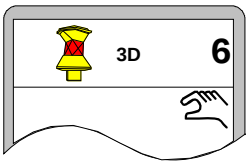
For the operation with MOBA 3D your MOBA dealer will provide you with a separate manual.

8.12.2 Controlling with the 3D TPS

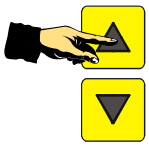
1) With the Auto / Manual key switch the controller to the operating mode “Manual”.

2) Select *3D TPS* as sensor as described above.

- The display shows the sensor symbol and the symbol for “Manual”.

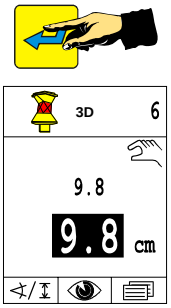


3) For the zero adjustment put the tool to working position by pressing the Up/Down keys at the controller or the machine’s operating unit.



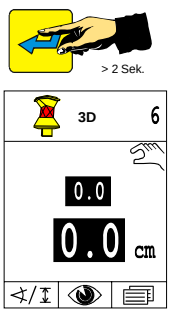
4a) Press the Enter key.

- The set point is coloured black and the current actual value is adopted as set point.



4b) Hold the Enter key for approx. 2 sec.

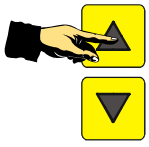
- The actual value and the set point first are coloured black.
- The actual value and the set point are assigned “0.0”.



5) With the Auto / Manual key switch to the operating mode “Automatic“.

- Depending on the position the controller moves the tool to the values given by the 3D system.

6) In automatic mode the set point can be changed via the Up/Down keys to carry out corrections.



8.13 Working with the 3D GNSS

Due to the fact that with the GNSS signal position accuracy can only be achieved in the range of a few centimetres, 3D GNSS systems for several applications only are suitable to a limited extent.

8.13.1 Assembly and setting

Put the MOBA 3D GNSS system into operation corresponding to its user manual.

Describing the assembly, wiring and configuration of the system components – detecting the machine dimensions and recording them in the 3D software – calibrating the mast slope sensor - and above all the description of the 3D software's functions would be going beyond the scope of this manual.

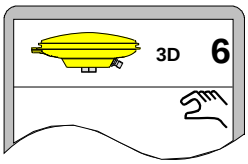
For the operation with MOBA 3D your MOBA dealer will provide you with a separate manual.

8.13.2 Controlling with the 3D GNSS

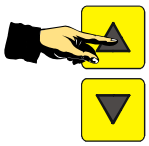
1) With the Auto / Manual key switch the controller to the operating mode “Manual”.

2) Select *3D GNSS* as sensor as described above.

- The display shows the sensor symbol and the symbol for “Manual”.

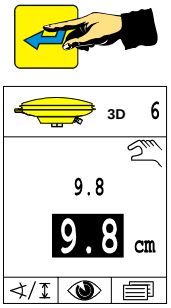


3) For the zero adjustment put the tool to working position by pressing the Up/Down keys at the controller or the machine’s operating unit.



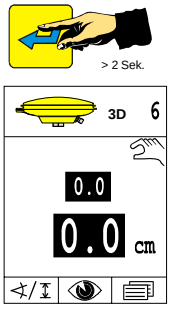
4a) Press the Enter key.

- The set point is coloured black and the current actual value is adopted as set point.



4b) Hold the Enter key for approx. 2 sec.

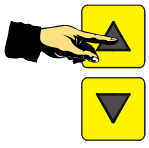
- The actual value and the set point first are coloured black.
- The actual value and the set point are assigned “0.0”.



5) With the Auto / Manual key switch to the operating mode “Automatic“.

- Depending on the position the controller moves the tool to the values given by the 3D system.

6) In automatic mode the set point can be changed via the Up/Down keys to carry out corrections.



8.14 Working with the 3D Slope Sensor

The 3D Slope Sensor is no additional sensor as such in its original sense.
For the detection of the tool slope's actual value the described Digi-Slope Sensor is used. Deviating from the operation with the Digi-Slope Sensor the setpoint adjustment when working with the 3D Slope Sensor is not carried out manually, but is automatically given by the 3D system depending on the position.
In the operating mode "Automatic" the operator cannot alter the set point.

8.14.1 Assembly and setting

Put the MOBA 3D system into operation corresponding to its user manual.

Describing the assembly, wiring and configuration of the system components - detecting the machine dimensions and recording them in the 3D software - calibrating the mast slope sensor - and above all the description of the 3D software's functions would be going beyond the scope of this manual.

For the operation with MOBA 3D your MOBA dealer will provide you with a separate manual.

8.14.2 Adjustment of the actual value

The adjustment of the actual value serves to adjust the Digi-Slope Sensor's measured value to the tool's actual slope.
This adjustment is necessary for example in case the Digi-Slope Sensor has not been mounted absolutely parallel to the tool's bottom edge.

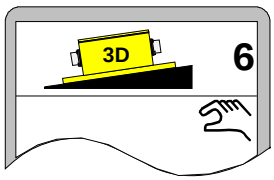
For further information and the description of the proceeding see section "Adjustment of the actual value" in this manual.

8.14.3 Controlling with the 3D Slope Sensor

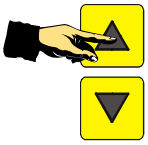
1) With the Auto / Manual key switch the controller to the operating mode “Manual”.

2) Select *3D Slope Sensor* as described above.

- The display shows the sensor symbol and the symbol for “Manual”.



3) With the Up/Down keys at the controller or the machine’s operating unit move the tool to the set point given for the current position by the 3D system.



4) With the Auto / Manual key switch to the operating mode “Automatic“.

- Depending on the position the controller moves the tool to the values given by the 3D system.

When working with the 3D Slope Sensor the set point cannot be adjusted with the Up/Down keys at the controller!
In case the slope has to be adjusted, first the Digi-Slope Sensor has to be chosen as active sensor.

8.15 Path-dependent operation with the Digi-Slope Sensor

This is not an additional sensor in its classical meaning.
To detect the actual value of the tool's slope, the Digi-Slope Sensor described above is used. Different from working with the Digi-Slope Sensor in the path-dependent working with the Digi-Slope Sensor the set point is not adjusted manually but is automatically set by the system depending on the covered distance. In the operating mode "Automatic" the user cannot adjust the set point.

Precondition This function is only available if a path signal is received or a respective sensor is connected.

Function If the path-dependent operation is selected during an ongoing cross slope control, the previous cross slope control continues unchanged in AUTO mode.
After the operation has been selected, the target cross slope and then the distance are queried. The target cross slope is the slope value that should occur at the end of the entered distance. When these two values have been entered, the path-dependent operation can be started.
At the function's start the differential between the current cross slope and the target cross slope is calculated once. This value is now linearly interpolated and adjusted corresponding to the distance.

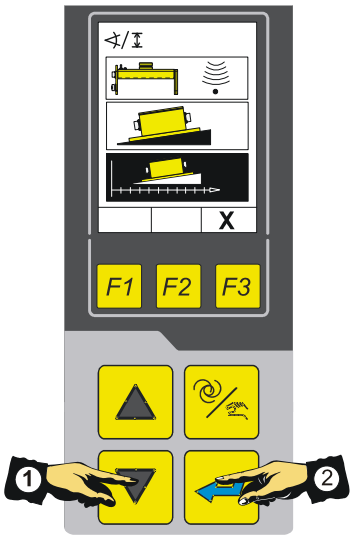
At the end of the distance the path-dependent control stops automatically and switches to normal cross slope control, i.e. the target cross slope is continuously kept constant.

8.15.1 Controlling with the path-dependent Digi-Slope Sensor

Press the function key F1 (⊀ ↧).

- The sensor selection menu opens.
- The symbol ⊀ ↧ appears in the upper left corner.

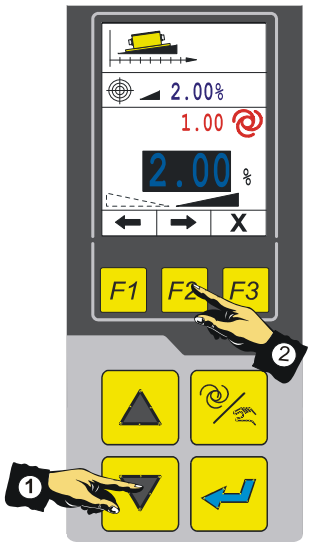
If the normal cross slope control has been active, it is not deactivated when selecting the path-dependent control.



With the Up/Down keys select the path-dependent control ①. If there are more options than fit on the display, the system automatically scrolls.

- The choice is marked black.

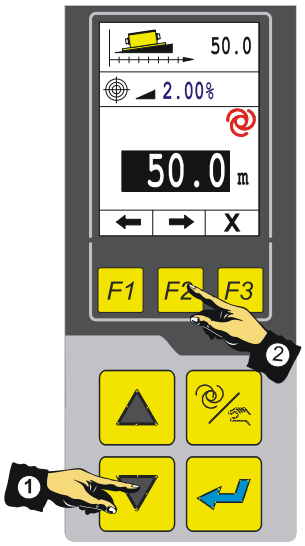
Acknowledge the choice with the Enter key ②.



Enter the favoured target cross slope with the Up/Down keys ①.

- The target cross slope is shown in the info line.

Press the function key F2 (➡) ②.

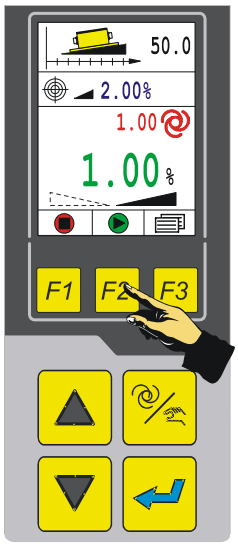


- The window for the distance entry opens.

With the Up/Down keys enter the distance the target cross slope should be reached at ①.

- The value appears in the headline next to the sensor symbol.

Press the function key F2 (➡) ② and check the settings.



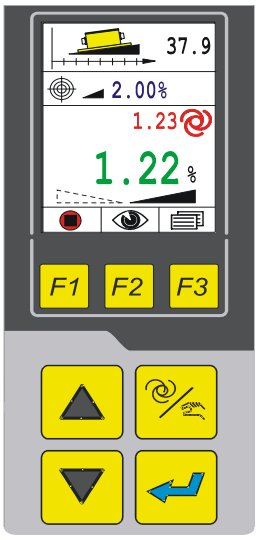
The functions of the path-dependent control:

Key F1 = Cancel

Key F2 = Start

Key F3 = Switch to operator menu

Activate the path-dependent control with F2 (▶).



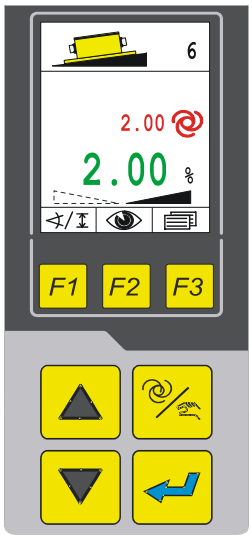
The path-dependent slope control is active.

- The headline shows the remaining distance.
- In the working window the set point is set automatically; the actual value is updated by the control.

Key F1 = Cancel

Key F2 = Switch to view menu

Key F3 = Switch to operator menu



- When the target has been reached (distance = 0; actual value and set point at target cross slope), the control automatically switches to normal (path-independent) control.

8.16 Cross operation

Definition

The term cross operation is used for “crosswise“ operation when levelling.
These special variants serve to operate the respectively other side’s levelling ”by remote control“. This way going to the screed’s other side to operate the opposite side (e.g. adjusting the tow point, changing the set point) is not necessary anymore.

Precondition

The cross operation is no serial standard function. It is only available in a fully wired system, i.e. if both controllers are connected via CAN.
Its activation or extent depends on the mode preset by the dealer.

Modes

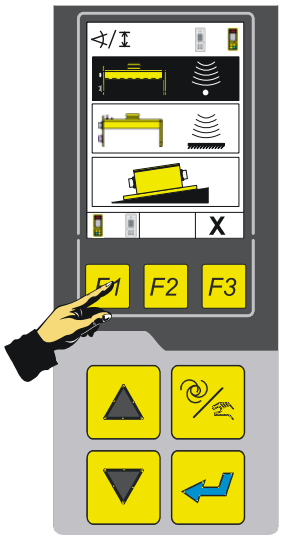
Your MOBA dealer can set the controller’s operation choosing from four variants differing from each other as follows:

0 no cross operation available
1 only display of the other side
2 display and operation of the other side
3 display and operation of both sides in table form

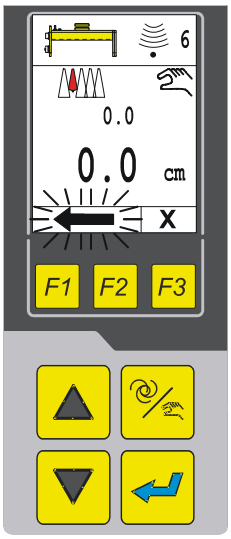
Irrespective of the cross operation’s preset mode, the MOBA-matic II’s LED arrow always only shows the state of the “own” side’s valve outputs also while the other side is displayed or operated.

Mode 0:
In this mode no cross operation is available.

Mode 1-3:



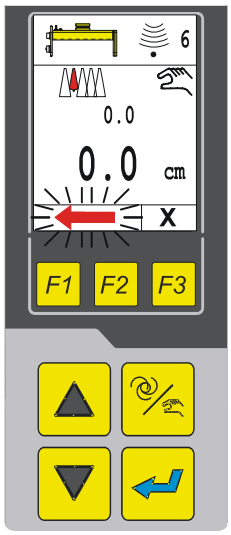
Call up the cross operation in the sensor selection menu with the function key F1.



Mode 1 (Standard):

- only display of the other side
- black flashing arrow points to the respective side
- automatic return after 5 sec.

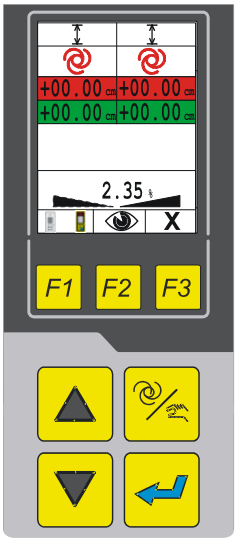
  If no key is pressed during this time, the cross operation switches off automatically.



Mode 2:

- display and direct operation of the other side
- red flashing arrow points to the respective side
- automatic return after 5 sec.

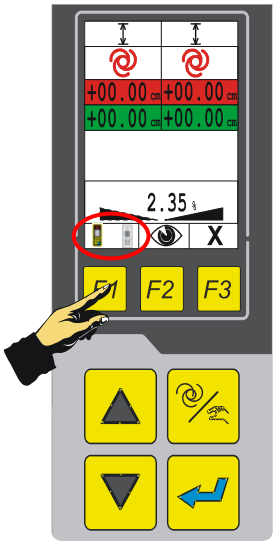
  If no key is pressed during this time, the cross operation switches off automatically.



Mode 3:

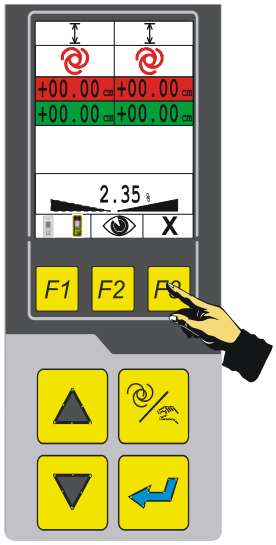
- display and operation of both sides
- no automatic return

By default, the operation is always set to the “own“ side.



Activate the operation of the other side by pressing **and holding** the function key F1.

- As long as F1 is pressed the relating display is inverted and the operating keys belong to the ”other“ side.



Press the function key F3 (**X**) to quit the cross operation and return to the working window.

9 Service and maintenance

Preface

The MOBA-matic II has been developed to meet a high degree of operational reliability.
Servicing the system only requires a minimum of time.
All electronic components are enclosed in robust housings to safeguard them against any possible mechanical damage.
Nevertheless the devices as well as the junction and connection cables should be periodically checked for potential damages and soilings.
Dirty oscillation heads may impair the ultrasonic sensors‘ function and cause sluggishness in the mechanics of the sensors with movable parts.

9.1 Cleaning and drying

The MOBA-matic II can also be cleaned by laypersons provided that the following instructions are observed.

Devices

1) Switch off the MOBA-matic II.
2) Put standard cleaning agent on a soft, lint-free cloth.
3) Clean the surfaces without applying any pressure.
4) With a clean cloth, completely remove the cleaning agent from the devices.

Do not on any account clean the display with agents containing abrasive substances. Otherwise the surface will be scratched and tarnished and the display gets more complicated to read.

Clean the digital controller and the sensors at maximum 40°C and dry them. Do not pack the equipment until it is fully dried.

Cables

To avoid poor contacts, the plug contacts and the connector threads have to be kept free of soil, grease, asphalt or other foreign material and to be protected from dampness. Blow out soiled connection cable plugs.

9.2 Repair

In case of damages or wear of the product please contact your local MOBA-dealer.

10 Leads on troubleshooting

Preface

When working with the MOBA-matic II a distinction is drawn between warning message and error message.

This section provides some information on measures which can or have to be taken in case of a warning message or an error message.
In some cases error sources can be excluded by strict observance of the regulations given in the manual.
This saves trouble and money preventing unnecessary down-times.

10.1 Safety instructions

The troubleshooting at the product may only be carried out by qualified specialized personnel.

Always switch the MOBA-matic II off when troubleshooting. In case voltage supply is required switch to the operating mode "Manual".

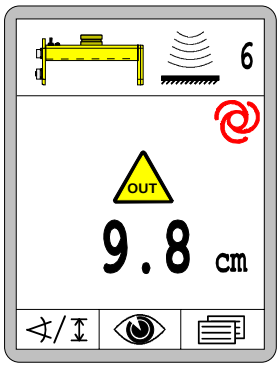
⚠ CAUTION

Risk of injury caused by inappropriate troubleshooting!
Inappropriate troubleshooting can lead to personal injuries or material damages.
Therefore:
- Have the troubleshooting exclusively carried out by qualified specialized personnel.
- Do not act precipitately when troubleshooting.
- Observe the country-specific legal safety and accident prevention regulations.

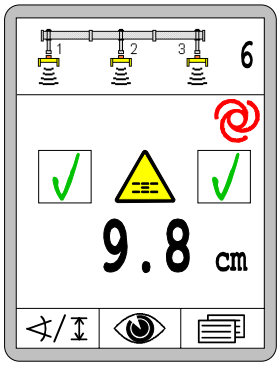
10.2 Fault finding and troubleshooting

Warning messages

Warning messages appear in the working window at the position of the active sensor's actual value.



For sensor combinations (Big Sonic-Ski®, Power Mast with Laser Receiver etc.) a separate warning message is shown for every single component.



If at the occurrence of a warning message the operating mode "Automatic" has been active

- the operating mode "Automatic" stays active
- the valve outputs are switched off
- the complete LED arrow flashes

In case the error cause disappears by itself (insect in the measuring range of an ultrasonic sensor, overrun pin etc.), the MOBA-matic II immediately continues working without the operator having to intervene.
If the disturbance lasts the cause has to be analysed and remedied.

Generally:

Cause: The sensor last used has been changed or disconnected;
Remedy: Choose another sensor from the sensor selection or check why the other sensor is not available anymore;

Cause: The active sensor's measured value has exceeded or fallen below the admissible measurement range or the power mast has reached the upper or lower stop position of its mechanical adjustment range;
Control outputs: The outputs are locked in automatic mode;
Remedy: Readjust the sensor to the reference;

Cause: The active sensor's control deviation is higher than the set control window;
Control outputs: The outputs are locked in automatic mode;
Remedy: Readjust the sensor to the reference;

When working with the Laser Receiver:

Cause: Due to reflections in its environment the laser receiver receives several different signals of the laser transmitter;
Control outputs: In automatic mode the outputs are locked;
Remedy: Cover the laser transmitter leaving out the actually required circular section;
Remove reflecting surfaces (vehicle glazing, windows etc.) from the laser beam's range of influence or cover these areas;

When working with the TPS (Total station)**:**

Cause: The total station has not been set horizontally;
Control outputs: The outputs are locked in automatic mode;
Remedy: Position the tripod with the total station in a way that the air bubble lies centrically in the glass tube's display range;

Cause: The total station's charge of battery is low;
Control outputs: The outputs still are being actuated in the automatic mode;
Remedy: Acknowledge the error message with any key;
Change the battery or charge it;

Cause: The measurement's accuracy is limited;
Control outputs: The outputs still are being actuated in the automatic mode;
Remedy: Acknowledge the error message with any key;
Make sure that the prism is clean and positioned in direct view of the total station;
Check the distance between the total station and the machine;
In the area above 250 m (shimmering air) and below 10 m the measurement accuracy may be affected;

Cause: Bad radio contact between total station and system PC;
Control outputs: The outputs still are being actuated in the automatic mode;
Remedy: Acknowledge the error message with any key;
Make sure that no metallic, shielding surfaces are positioned between the total station and the system PC;

When working with the GNSS (Global Navigation Satellite Systems)**:**

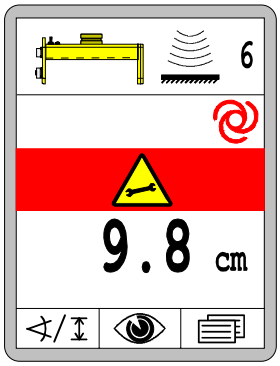
Cause: The measurement's accuracy is limited;
Possible bad satellite constellation due to partial shadowing;
Control outputs: The outputs still are being actuated in the automatic mode;
Remedy: Acknowledge the error message with any key;
Make sure that the sky is "free" of trees, signs, roofs etc. above or in direct proximity of the antenna;

Cause: The base station's charge of battery is low;
Control outputs: The outputs still are being actuated in the automatic mode;
Remedy: Acknowledge the error message with any key;
Change the battery or charge it;

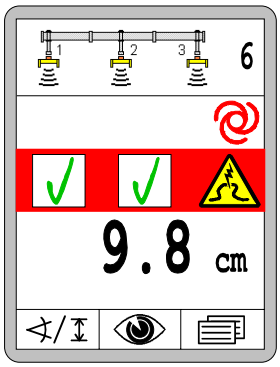
Cause: Bad radio contact between base station and the machine's GNSS receiver;
Control outputs: The outputs are locked in automatic mode;
Remedy: Acknowledge the error message with any key;
Make sure that no metallic, shielding surfaces are positioned between the total station and the system PC;

Error messages

Always being displayed in the signal colour “red“ error messages stand out against warning messages.
In contrast to the warnings that usually are only shown for a short time and disappear by themselves, error messages mostly refer to defects.
Similar to the warning messages error messages appear in the working window at the position of the active sensor’s actual value.



For sensor combinations (Big Sonic-Ski®, Power Mast with Laser Receiver etc.) a separate warning message is shown for every single component.

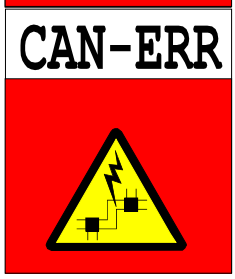


If at the occurrence of an error message the operating mode “Automatic“ has been active

- the operating mode “Automatic“ stays active
- the valve outputs are switched off
- the complete LED arrow flashes

Error messages of the system are shown in the whole display.

Cause: Saved data has been lost;
Control outputs: The outputs are locked in automatic mode;
Remedy: Acknowledge the error message with any key and reset the working point and the set point;
In case of recurrence contract your MOBA dealer;



Cause: An error has occurred in the CAN network;
Control outputs: The outputs are locked in automatic mode;
Remedy: Check all connecting cables of the system for damage;
Contact your MOBA dealer;

Cause: The supply voltage of the digital controller's input has fallen below the admissible limit; the sensors do not work reliably anymore;
Control outputs: The outputs are locked in automatic mode;
Remedy: Check the digital controller's voltage supply;
Often too thin cable diameters, too long cable lengths or too high transfer resistance at connections cause voltage drops;

Cause: The temperature inside the digital controller approaches the maximum admissible temperature;
Consequence: If the device continues to heat up it automatically switches off when reaching the maximum admissible temperature;
Remedy: Acknowledge the error message with any key – the controller first will continue working as usual;
Provide a remedy against further heating (shadowing; cooling; different assembly site etc.);

Cause: The temperature inside the digital controller approaches the minimum admissible temperature;
Consequence: If the device continues to cool down it automatically switches off when reaching the minimum admissible temperature; the display lighting stays switched on as heat source [1)];
Remedy: Acknowledge the error message with any key – the controller first will continue working as usual;
protect the controller against further cooling;

1) Remark: If the digital controller is commissioned at a temperature under the specified working temperature (also see technical data) all LEDs flash. The display lighting is switched on and serves as internal heating source until the display can be switched on again without any risks. Depending on the ambient temperature this can take 10 to 15 minutes.

Generally:

Cause: The connection to the active sensor has been abruptly interrupted during the working process;
Control outputs: The outputs are locked in automatic mode;
Remedy: Check the sensor's connection cable for damage and change if necessary;
Change the sensor;

Cause: The active sensor transmits inadmissible or inconsistent messages or measured values;
Control outputs: The outputs are locked in automatic mode;
Remedy: Plug the sensor out, reset it over the reference and plug it in again;
If necessary, change the sensor;

When working with the Power Mast:

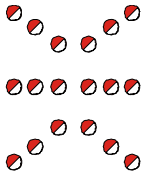
Cause: Featured with an internal own measuring system the power mast detects any time how long it currently has been extended;
During exceptional circumstances it may occur that the mast “forgets“ this current position;
Control outputs: The outputs are locked in automatic mode;
Remedy: Retract the power mast completely to let it reinitialise itself automatically in this position;

Cause: Although a digital controller’s output has been actuated no current flows to or into the power mast;
Control outputs: The outputs are locked in automatic mode;
Remedy: Check the power mast’s connecting cable for damage and change if necessary;

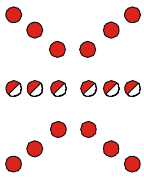
Cause: Although a digital controller’s output has been actuated the power mast does not move – the mast is stuck or blocked;
Control outputs: The outputs are locked in automatic mode;
Remedy: Check if an obstacle obstructs the mast, if the mast is bent or if the mast’s moveable mechanical parts are soiled and blocked;

When working with the Laser Receiver:

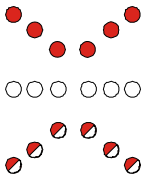
Reflection errors (e.g. caused by reflecting surfaces or flashlights on the construction site) are the most frequent disturbances when working with laser systems.
The laser receiver therefore reads out the laser transmitter's impinging signals, evaluates them and shows error situations via its LED display as follows:



Cause: No laser beam hits the laser receiver;
Control outputs: The outputs are locked in automatic mode;
Remedy: Readjust the laser receiver to the laser beam;

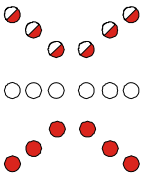


Cause: The laser receiver is either hit non-cyclically by laser beams or simultaneously by several laser pulses;
Control outputs: The outputs are locked in automatic mode;
Remedy: Shield off the laser transmitter from all but the circular sectional view actually needed;
Remove reflecting surfaces (vehicle glazing, windows etc.) from the laser beam's range of influence or cover these areas;
Check whether a second laser transmitter is operating in the vicinity;



Cause: The laser transmitter's specified minimum rotation speed has been underrun (<10 Hz [U/sec]);
Control outputs: The outputs are locked in automatic mode;
Remedy: Increase the laser transmitter's speed of rotation in case it features a rotation speed control;
Check the battery / the voltage supply of the laser transmitter;

Legend: ○ = LED is off ◪ = LED flashes ● = LED is on



Cause: The laser transmitter's maximum rotation speed has been exceeded (>20 Hz [U/sec]);
Control outputs: The outputs are locked in automatic mode;
Remedy: Reduce the laser transmitter's speed of rotation in case it features a rotation speed control;
Remove reflecting surfaces (vehicle glazing, windows etc.) from the laser beam's range of influence or cover these areas;

Legend: ○ = LED is off ◔ = LED flashes ● = LED is on

When working with the TPS (Total station)**:**

Cause: The total station has lost the prism, i.e. the “direct view“ is interrupted;
Control outputs: The outputs are locked in automatic mode;
Remedy: After a measurement interruption the total station automatically restarts tracking;
As the case may be the total station’s prism search has to be started manually by the operator;

Cause: The total station’s prism search is in progress;
Control outputs: The outputs are locked in automatic mode;
Remedy: Please wait a moment; the prism search can take some time;
Optionally start the total station’s “advanced search”;

Cause: A non-specific 3D error has occurred;
Control outputs: The outputs are locked in automatic mode;
Remedy: Observe the error notes on the total station’s and system PC’s displays;

Cause: The total station’s battery is dead;
Control outputs: The outputs are locked in automatic mode;
Remedy: Change the battery or charge it;

Cause: The machine is out of the project or the surface design;
Control outputs: The outputs are locked in automatic mode;
Remedy: Move back to the project or choose the surface design corresponding to the current position;

Cause: The radio contact between total station and system PC has been disconnected;
Control outputs: The outputs are locked in automatic mode;
Remedy: Check the radio units‘ wiring and voltage supply;
Check the total station’s and radio unit’s LED that visualises the radio connection;
Make sure that no metallic, shielding surfaces are positioned between the total station and the system PC;

When working with GNSS (Global Navigation Satellite Systems)**:**

Cause: Due to the missing correction signal the GPS does not provide a valid position;
Control outputs: The outputs are locked in automatic mode;
Remedy: Please wait a moment; the search for the number of satellites necessary for a safe determination of position can take some time;
Check the date of the correction last received in the 3D software. The correction signal should be coming in cyclically once a second;

Cause: Due to an insufficient number of satellites the GPS does not provide a valid position;
Control outputs: The outputs are locked in automatic mode;
Remedy: Please wait a moment; the search for the number of satellites necessary for a safe determination of position can take some time;
In case the error message should be displayed over a longer period, please move to an area at the job site with an „open sky“;

Cause: A non-specific 3D error has occurred;
Control outputs: The outputs are locked in automatic mode;
Remedy: Observe the error notes on the total station’s and system PC’s displays;

Cause: The base station’s battery is dead;
Control outputs: The outputs are locked in automatic mode;
Remedy: Change the battery or charge it;

Cause: The machine is out of the project or the surface design;
Control outputs: The outputs are locked in automatic mode;
Remedy: Move back to the project or choose the surface design corresponding to the current position;

Cause: The radio contact between base station and system PC has been disconnected;
Control outputs: The outputs are locked in automatic mode;
Remedy: Check the radio units‘ wiring and voltage supply;
Make sure that the base station is working and no shielding, metallic surfaces are positioned in front of it;

11 Technical data

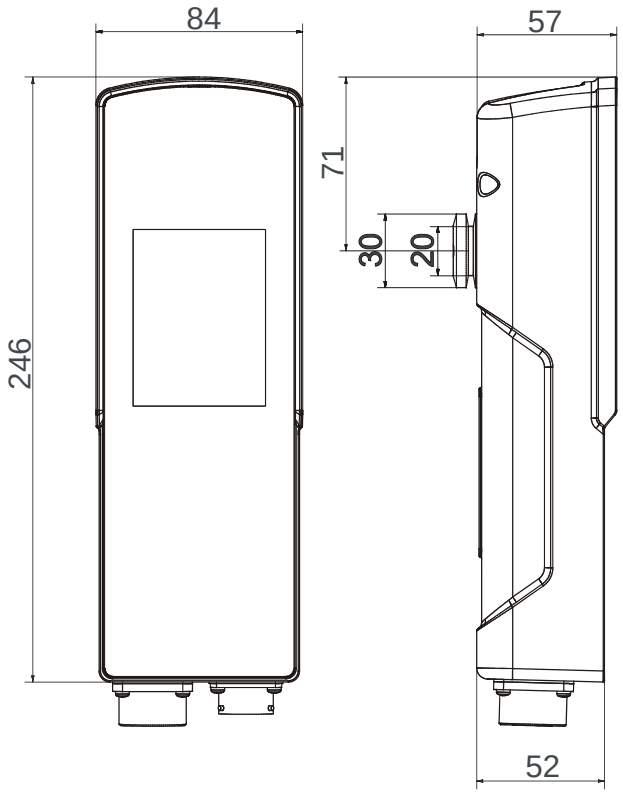
Preface

On the following pages you will find data sheets, current at the time of the user manual's generation, referring the different system components
Besides a dimensioned diagram of the device they contain a description of its interfaces and several basic technical remarks.

Subject to alteration

To preserve our technological advance, it can be necessary to undertake product modifications without prior notice which under circumstances may not correspond to this manual. In that case your MOBA-supplier will provide you with the updated data sheets.

MOBA-matic II MMC-2000



Technische Daten (Technical data):

Betriebsspannung (voltage range):
11 V ... 30 V (DC)

Stromaufnahme (current consumption):
ca. 300 mA ohne Ventile (without valves)

Leistungsausgänge (power outputs):
ON/OFF, PNP/NPN, max. 3 A
PROP, PNP, max. 2,5 A (max. 2.5 A)

CAN-Schnittstelle (CAN-interface):
2x ISO 11898 - 24 V
125 kBit/s - 250kBit/s

Arbeitstemperaturbereich (operating temperature range):
-20 °C ... +70 °C

Lagertemperaturbereich (storage temperature range):
-30°C ... +80 °C

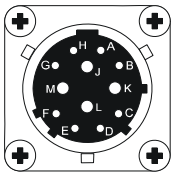
Schutzart (ingress protection):
IP 67

Gewicht (weight):
ca. 1,9 kg (approx. 1.9 kg)

Pinbelegung (Pin connection):
Power-Schnittstelle (power interface)

12pol. Gerätestecker, Bajonettverbindung
(12-pin plug, bayonet type connection)

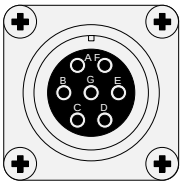
A = Eingang „Extern Hand“ (input “Valve interruption“)
B = CAN-
C = CAN+
D = Eingang „Seitenerkennung“ (input “Machine side detection“)
E = Eingang „Grade/Slope-Umschaltung“ (input ”Grade/Slope switchover“)
F = Ausgang „Alarm“ (output ”Alarm“)
G = n.c.
H = n.c.
J = Ausgang „Senken“ (output “Down“)
K = Ausgang „Heben“ (output “Up“)
L = + Betriebsspannung (supply voltage)
M = - Betriebsspannung (supply voltage)



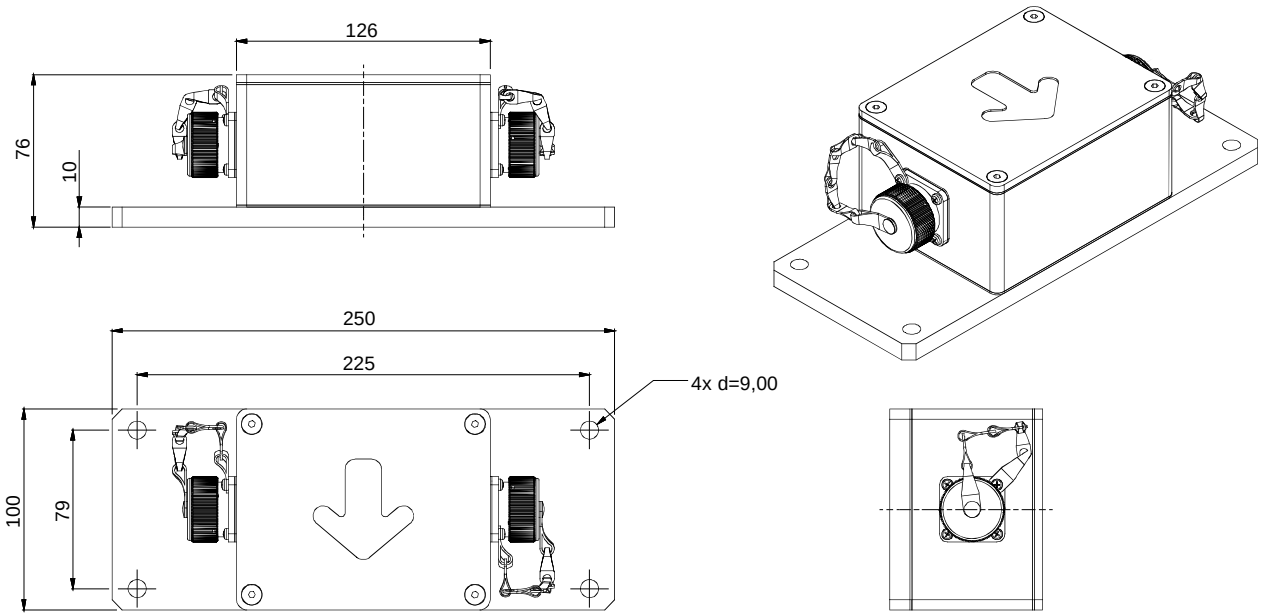
Sensor-Schnittstelle (sensor interface)

7pol. Gerätedose; Bajonettverbindung
(7-hole socket; bayonet type connection)

A = + Betriebsspannung (supply voltage)
B = CAN+
C = - Betriebsspannung (supply voltage)
D = CAN-
E = Ein- und Ausgang „Adresse1“ (digital I/O ”Address1”)
F = n.c.
G = Schirm (shield)



Digi-Slope Sensor SLOS-0150



Technische Daten (Technical data):

Betriebsspannung (voltage range):
11 ... 30 V DC

Stromaufnahme (current consumption):
max. 50 mA

Messbereich (measuring range):
+/- 10°

Interne Auflösung (internal resolution):
0,01 %

Nullpunktstabilität (zero point stability):
0,1 %

Arbeitstemperaturbereich (operating temperature range):
-10 ... +70 °C

Lagertemperaturbereich (storage temperature range):
-25 ... +80 °C

Schutzart (ingress protection):
IP 67

Schockbeanspruchung (shock resistance):
15 g, 15 ms nach DIN EN 60068-2-29

Farbe (colour):
RAL 1021 rapsgelb, Mikrostruktur (rape yellow, microstructure)

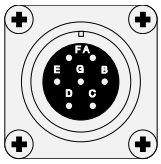
Gewicht (weight):
ca. 1,75 kg (approx. 1.75 kg)

Pinbelegung (Pin connection):

CAN-Schnittstelle (CAN interface)
ISO 11898 – 24 V – 125 kBit/sec

7pol. Gerätestecker; Bajonettverbindung
(7pin male connector; bayonet type connection)

- A = + Betriebsspannung (supply voltage)
- B = CAN+
- C = - Betriebsspannung (supply voltage)
- D = CAN-
- E = Adr.1
- F = Adr.2
- G = Schirm (shield)



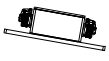
Links (left):

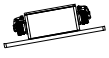
- E = n.c.
- F = n.c.

Rechts (right):

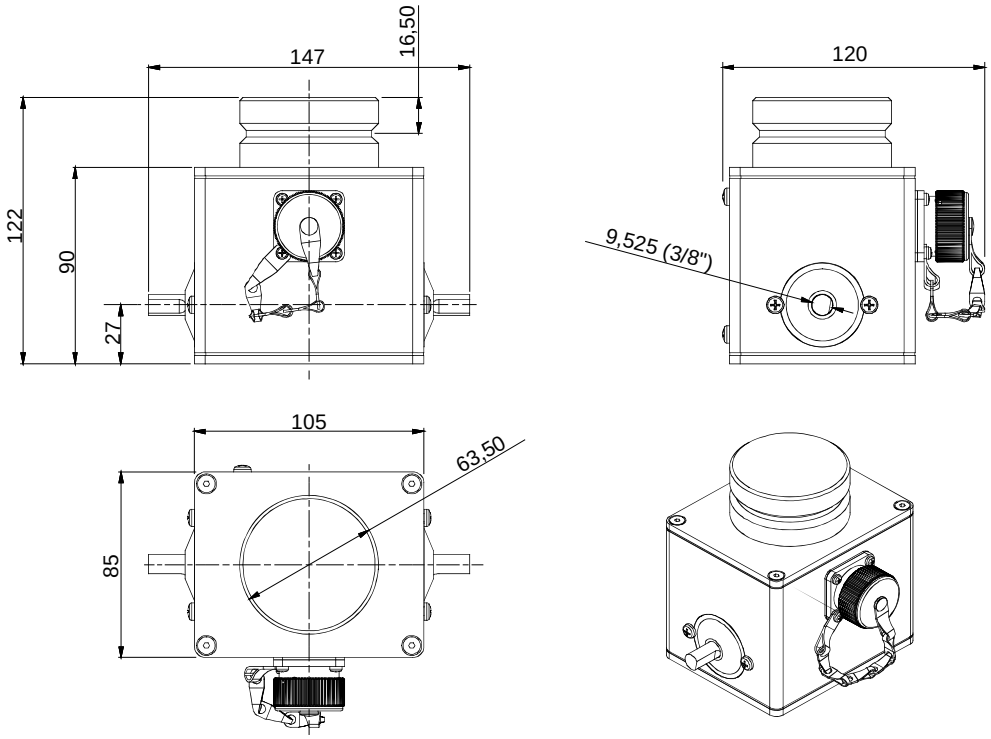
- E = - Betriebsspannung (supply voltage)
- F = n.c.

Bemerkung (Remark):

 = neg. Neigung (neg. slope)

 = pos. Neigung (pos. slope)

Digi-Rotary Sensor ROTS-0300



Technische Daten (Technical data):

Betriebsspannung (voltage range):
11 ... 30 V DC

Stromaufnahme (current consumption):
max. 50 mA

Zulässige Restwelligkeit (allowable residual ripple):
+/- 10 %

Erfassungsbereich (measuring range):
+/- 30°

Interne Auflösung (internal resolution):
0,1°

Reproduzierbakeit (reproduceability):
+/- 0,1°

Arbeitstemperaturbereich (operating temperature range):
-10 ... +70 °C

Lagertemperaturbereich (storage temperature range):
-25 ... +80 °C

Schutzart (ingress protection):
IP 67

Farbe (colour):
RAL 1021, rapsgelb, Microstruktur (rape yellow microstructure)

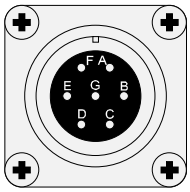
Gewicht (weight):
ca. 1,1 kg (approx. 1.1 kg)

Pinbelegung (Pin connection):

CAN-Schnittstelle (CAN interface)
ISO 11898 – 24 V; 125 kBits/sec

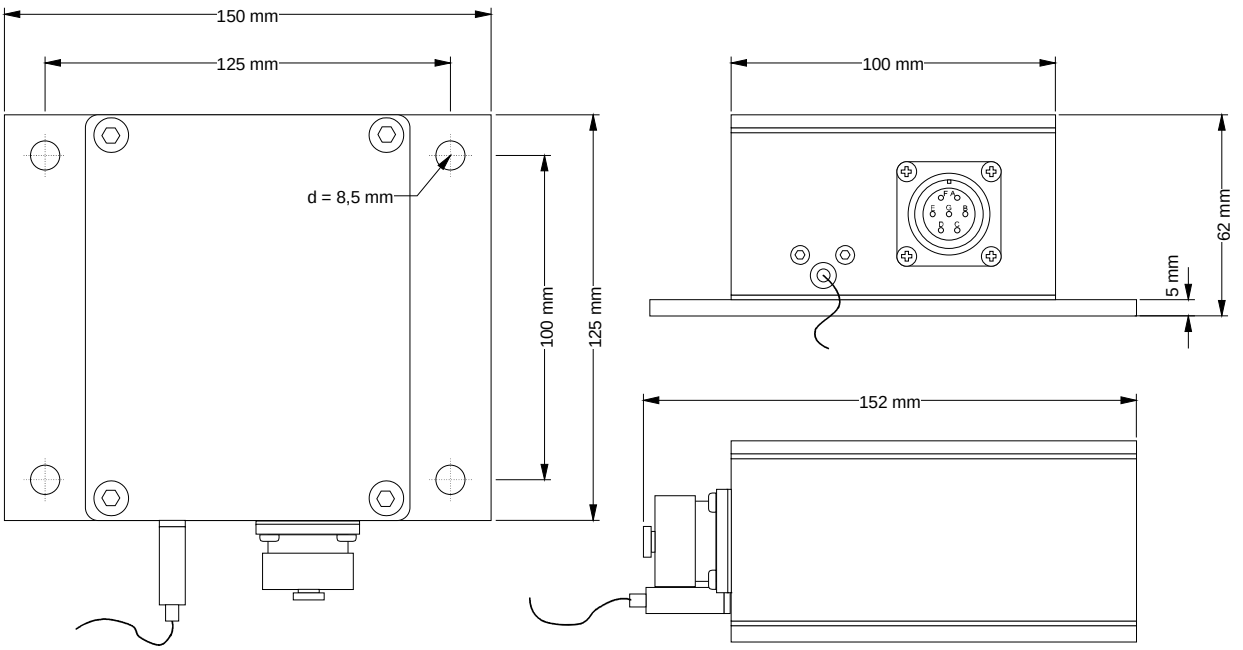
7pol. Gerätestecker; Bajonettverbindung
(7pin male connector; bayonet type connection)

A = + Betriebsspannung (+ supply voltage)
B = CAN+
C = - Betriebsspannung (- supply voltage)
D = CAN-
E = Adr.1
F = Adr.2
G = Schirm (shield)



Bemerkung (Remark):

Wire-Rope Sensor ROPS-0900



Technische Daten (Technical data):

Betriebsspannung (voltage range):
10 ... 30 V DC

Stromaufnahme (current consumption):
< 200 mA

Messbereich (measuring range):
50 cm

Auflösung (resolution):
0,1 mm

Reproduzierbarkeit (reproducibility):
+/- 0,5 mm

Linearität (linearity):
+/- 0,3 % vom Messbereichsendwert

Arbeitstemperaturbereich (operating temperature range):
-10 ... +60 °C

Lagertemperaturbereich (storage temperature range):
-25 ... +75 °C

Schutzart (ingress protection):
IP 54

Farbe (colour):
RAL 1021, rapsgelb, Microstruktur (rape yellow, microstructure)

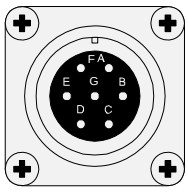
Gewicht (weight):
ca. 1,75 kg (approx. 1.75 kg)

Pinbelegung (Pin connection):

CAN-Schnittstelle (CAN interface)
ISO 11898 - 24 V – 125 kBit/sec

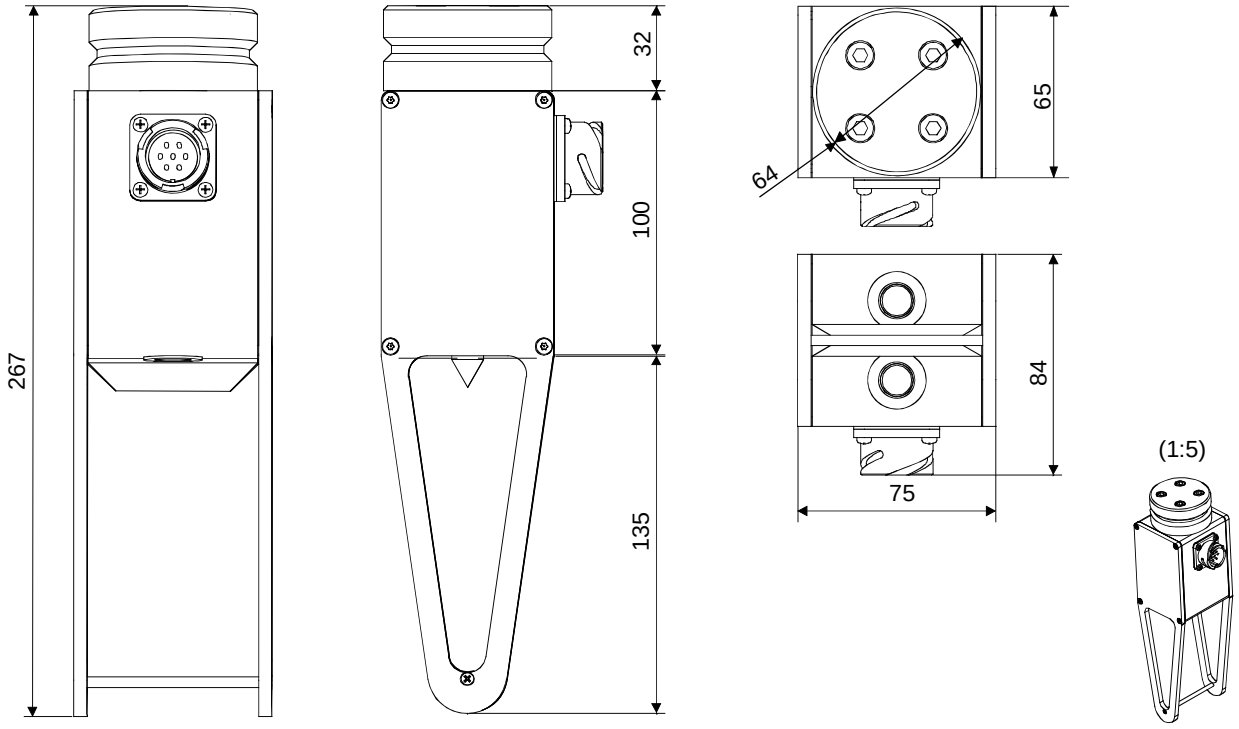
7pol. Gerätestecker; Bajonettverbindung
(7pin plug; bayonet type connection)

A = + Betriebsspannung (+ supply voltage)
B = CAN +
C = - Betriebsspannung (- supply voltage)
D = CAN -
E = Adr.1
F = Adr.2
G = Schirm (shield)



Bemerkung (Remark):

Dual-Sonic Sensor DUAS-1000



Technische Daten (Technical data):

Betriebsspannung (voltage range):
10 V ... 30 V (DC)

Stromaufnahme (current consumption):
< 100 mA @ 24 V
< 200 mA @ 12 V

Messbereich (measuring range):
20 cm ... 100 cm

Linearitätsabweichung (linearity deviation):
0,2 % vom Endwert (of full scale)

Offset (offset):
± 1 mm

Temperaturabweichung im Bereich -25 °C ... +85 °C
(temperature deviation at the range
-25 °C ... +85 °C)
max. ± 1 % vom Messwert (of the measured value)

Arbeitstemperaturbereich (operating temperature range):
-25 °C ... +85 °C

Lagertemperaturbereich (storage temperature range):
-25 °C ... +85 °C

Schutzart (ingress protection):
IP 67

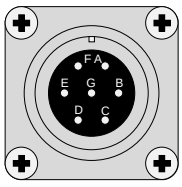
Pinbelegung (Pin connection):

CAN-Schnittstelle (CAN interface)

ISO 11898 - 24 V
125 kBit/sec

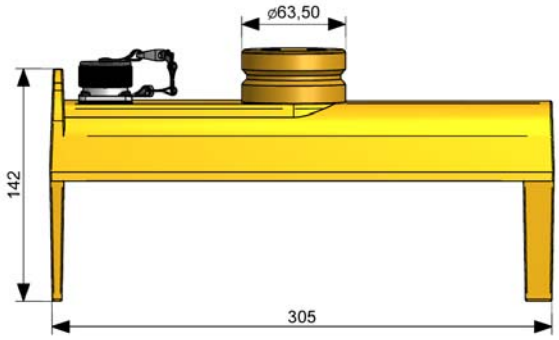
7pol. Gerätestecker; Bajonettverbindung
(7pin connector; bayonet type connection)

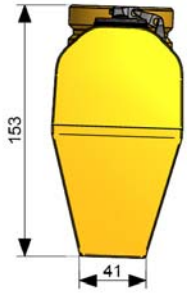
A = + Betriebsspannung (supply voltage)
B = CAN+
C = - Betriebsspannung (supply voltage)
D = CAN-
E = Adr. 1
F = Adr. 2
G = Schirm (shield)

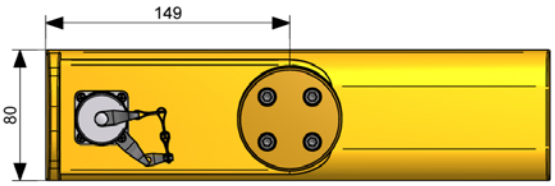


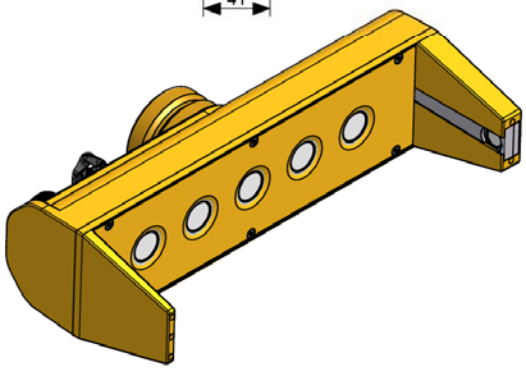
Bemerkung (Remark):

Sonic-Ski® plus SKIS-1500









Technische Daten (Technical data):

Betriebsspannung (voltage range):
10 V ... 30 V (DC)

Stromaufnahme (current consumption):
max. 300 mA

Arbeitsbereich (working range):

Bodenabtastung (ground sensing)
20 cm ...150 cm

Seilabtastung (string line sensing)
20 cm ...100 cm

Reproduzierbarkeit (reproducibility):
+/- 1 mm

Arbeitstemperaturbereich (operating temperature range):
-25 °C ... +85 °C

Lagertemperaturbereich (storage temperature range):
-40 °C ... +85 °C
Schutzart (ingress protection):
IP 67

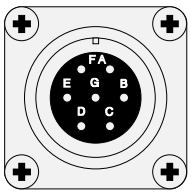
Gewicht (weight):
ca. 2,1 kg (approx. 2.1 kg)

Pinbelegung (Pin connection):

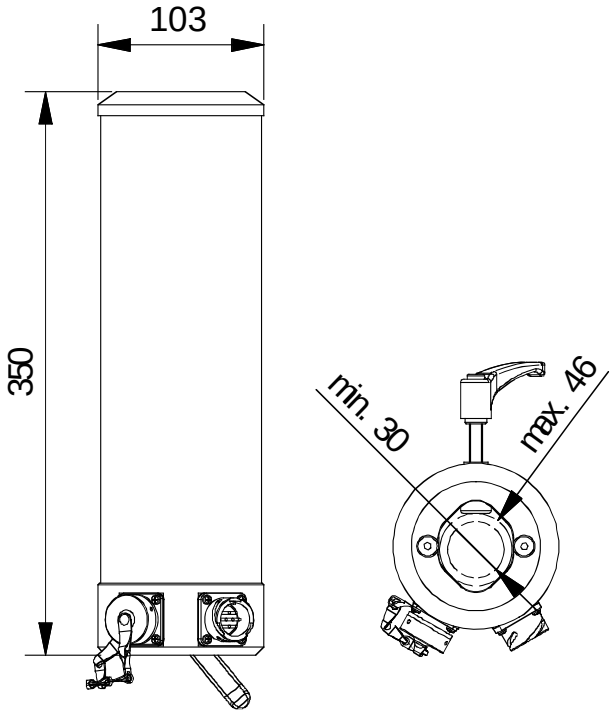
CAN-Schnittstelle (CAN interface)
ISO 11898 – 24 V – 125 kBit/sec

7pol. Gerätestecker; Bajonettverbindung
(7-pin male connector; bayonet type connection)

A = + Betriebsspannung (+ supply voltage)
B = CAN+
C = - Betriebsspannung (- supply voltage)
D = CAN-
E = Adr.1
F = Adr.2
G = Schirm (shield)



Laser Receiver LS-3000



Technische Daten (Technical data):

Betriebsspannung (voltage range):
10 ... 30 V DC

Stromaufnahme (current consumption):
ca. 260 mA @ 12 V
ca. 135 mA @ 24 V

Arbeitsdurchmesser (working diameter):
600 m senderabhängig (depending on transmitter)

Empfangswinkel (receiving angle):
360°

Empfangsbereich (receiving range):
290 mm

Messbereich (measuring range):
284 mm

Auflösung (resolution):
0,1 mm

Wellenlänge (wavelength):
Sensitivität (sensitivity) >30% @ 600 < λ < 1030 nm
Max. Sensitivität (sensitivity) @ λ = 850 nm

Sender Rotationsfrequenz (transmitter rotation Frequency):
10 Hz ... 20 Hz (+/- 10%)

Schnittstellen (interfaces):
1x PWM-Schnittstelle (PWM interface)
1x CAN-Schnittstelle (CAN interface)
ISO 11898 - 24 V
50/125/250/500/1000 kBit/sec

Arbeitstemperaturbereich (operating temperature range):
-40 ... +70 °C

Lagertemperaturbereich (storage temperature range):
-40 ... +70 °C

Schutzart (ingress protection):
IP 67

Gewicht (weight):
ca. 1,8 kg (approx. 1.8 kg)

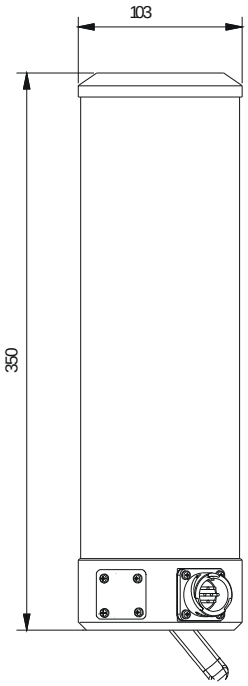
Mastdurchmesser (mast diameter):
bis 46 mm (up to 1.8 inches)

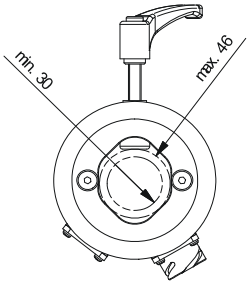
Bemerkungen (Remarks):

Integrierte Positionierhilfe
(integrated positioning aid);

Dynamische Anpassung der Empfindlichkeit bei wechselnden Lichtverhältnissen;
(dynamical adjustment of sensitivity at varying light conditions)

Laser Receiver CLS-3000





Technische Daten (Technical data):

Betriebsspannung (voltage range):
10 ... 30 V DC

Stromaufnahme (current consumption):
ca. 250 mA @ 12 V
ca. 130 mA @ 24 V

Arbeitsdurchmesser (working diameter):
600 m senderabhängig (depending on transmitter)

Empfangswinkel (receiving angle):
360°

Empfangsbereich (receiving range):
210 mm

Auflösung um den Nullpunkt (resolution at zero point):
± 4 mm

Wellenlänge (wavelength):
Sensitivität (sensitivity) >30% @ 600 < λ < 1030 nm
Max. Sensitivität (sensitivity) @ λ = 850 nm

Sender Rotationsfrequenz (transmitter rotation frequency):
10 Hz ... 20 Hz (+/- 10%)

Schnittstellen (interfaces):

CAN-Schnittstelle (CAN interface)
ISO 11898 - 24 V
50/125/250/500/1000 kBit/sec

Arbeitstemperaturbereich (operating temperature range):
-40 ... +70 °C

Lagertemperaturbereich (storage temperature range):
-40 ... +70 °C

Schutzart (ingress protection):
IP 67

Gewicht (weight):
ca. 1,8 kg (approx. 1.8 kg)

Mastdurchmesser (mast diameter):
bis 46 mm (up to 1.8 inches)

Bemerkungen (Remarks):

Integrierte Positionierhilfe
(integrated positioning aid);

Dynamische Anpassung der Empfindlichkeit bei wechselnden Lichtverhältnissen;
(dynamical adjustment of sensitivity at varying light conditions)

12 Declarations of conformity

MOBA
MOBILE AUTOMATION

KONFORMITÄTSERKLÄRUNG
Declaration of Conformity
Declaration de Conformité

This corresponds to EN ISO/IEC 17050-1

Wir / We / Nous

MOBA Mobile Automation AG
Kapellenstraße 15
D-65555 Limburg (Germany)

erklären in alleiniger Verantwortung, dass das Produkt
declare under our sole responsibility that the product
déclarons sous notre seule responsabilité que le produit

HMI/Controller "MOBA-matic II", CAN
04-25-10500

auf das sich diese Erklärung bezieht, mit den folgenden Normen übereinstimmt
to which this declaration relates is in conformity with the following standards
auquel se réfère cette déclaration est conforme aux normes

EN 13309 (2010)

verified standards

EN55022, Class B (2008-5)

EN61000-1-2 (2009-12)

EN61000-4-3 (2011-04)

EN61000-4-4 (2010-11)

EN61000-4-6 (2009-12)

ISO 7637-2 Puls 1, 2, 2b, 4, 5 (2011-03)

gemäß den Bestimmungen der Richtlinie
following the provisions of Directive
conformément aux dispositions de Directive

Electromagnetic compatibility 2004/108/EC

Limburg, den 01.12.2011

i.V. Matthias Weber
Leiter Qualitätsmanagement

Hausanschrift:
MOBA Mobile Automation AG
Kapellenstraße 15
65555 Limburg
Germany
Telefon +49 6431 9577-0
Fax +49 6431 9577-177

Sitz der Gesellschaft: Limburg
Registergericht Limburg, HRB 7562
Vorsitzender des Aufsichtsrats: Horst Rühl
Vorstand: Volker G. Hanus, Dr. Holger Berthel,
Alfons Horn, Doris Sroblewski
USt-IdNr.: DE 113888988

Bankverbindungen:
Deutsche Bank AG, Limburg BLZ 511 700 10 Konto-Nr. 4[illegible]
IBAN: DE 85 5117 0010 0419 0700 00 - BIC/SWIFT-Code: DEUTDEFF511
Commerzbank AG Limburg BLZ 511 400 29 Konto-Nr. 32[illegible]
IBAN: DE 16 5114 0029 0272 3430 00 - BIC/SWIFT-Code: COBADEFF511
Kreissparkasse Limburg BLZ 511 500 18 Konto-Nr. 30 370 0[illegible]
IBAN: DE 10 5115 0018 0030 3700 15 - BIC/SWIFT-Code: HELADEF1LIM

MOBA
MOBILE AUTOMATION

CE KONFORMITÄTSERKLÄRUNG

entsprechend ISO/IEC Guide 22 und EN 45014

Name des Herstellers: MOBA Mobile Automation AG

Anschrift des Herstellers: MOBA Mobile Automation AG
Kapellenstraße 15
D-65555 Limburg (Germany)

erklärt, dass das Produkt:

Produktname: **Dual Sonic Sensor, CAN**
04-21-10100

den folgenden Produktspezifikationen entspricht:

EMV (EMC): EN 13309:2000 / Schmalband, Breitband Störaussendung

EN61000-4-2 (2001)

EN61000-4-3 (2003)

EN61000-4-4 (2002)

EN61000-4-6 (2001)

ISO 7637-2 (Impulse 1, 2)

ISO 7637-2 ISO Puls 5

Das Produkt entspricht den Anforderungen der EMV- Verordnung 89/336/EWG.
Es wurde in einer typischen Konfiguration getestet.

Limburg, den 05. Februar 2007

i.V. Matthias Weber
Leiter Qualitätsmanagement

Hausanschrift
MOBA Mobile Automation AG
Kapellenstraße 15
65555 Limburg
Germany
Telefon +49 6431 8277-0
Fax +49 6431 8277 17

Sitz der Gesellschaft: Ok
Registergericht: Limburg HRB 2552
Vorsitzender des Aufsichtsrates: Paul G. Hanna
Vorstand: Volker S. Hanna, Wilhelm Sala

Bankverbindungen
Commerzbank AG Limburg BLZ 511 400 20 Konto-Nr. 977348800
Commerzbank AG Dresden BLZ 850 400 00 Konto-Nr. 1093047
Nassauische Sparkasse Limburg BLZ 511 500 18 Konto-Nr. 3013007
Dresdner Bank AG Hoechst BLZ 500 800 00 Konto-Nr. 7700271 00
Deutsche Bank AG Limburg BLZ 511 700 10 Konto-Nr. 4940000
Postbank Frankfurt/Main BLZ 500 100 60 Konto-Nr. 55534901

MOBA
MOBILE AUTOMATION

KONFORMITÄTSERKLÄRUNG
Declaration of Conformity
Declaration de Conformité

This corresponds to EN ISO/IEC 17050-1

Wir / We / Nous

MOBA Mobile Automation AG
Kapellenstraße 15
D-65555 Limburg (Germany)

erklären in alleiniger Verantwortung, dass das Produkt
declare under our sole responsibility that the product
déclarons sous notre seule responsabilité que le produit

Sonic-Ski plus, (CAN)
04-21-10120

auf das sich diese Erklärung bezieht, mit den folgenden Normen übereinstimmt
to which this declaration relates is in conformity with the following standards
auquel se réfère cette déclaration est conforme aux normes

EN 13309 (2000)

verified standards

EN55022, Class B (2008-5)

EN61000-4-2 (2001-12)

EN61000-4-3 (2006-06)

EN61000-4-4 (2005-07)

EN61000-4-6 (2008-04)

ISO 7637-2 Puls 1, 2, 2b, 4, 5 (2004-06)

gemäß den Bestimmungen der Richtlinie
following the provisions of Directive
conformément aux dispositions de Directive

Electromagnetic compatibility 2004/108/EC

Limburg, den 27.07.2009

i.V. Matthias Weber
Leiter Qualitätsmanagement

Hausanschrift:
MOBA Mobile Automation AG
Kapellenstraße 15
65555 Limburg
Germany
Telefon: +49 6431 9577-0
Fax: +49 6431 9577-177

Sitz der Gesellschaft: Limburg
Registergericht Limburg HRB 2852
Vorsitzender des Aufsichtsrats: Harald Hoos
Vorstand: Volker G. Harms, Dr. Holger Bartel
Alfred Herr, David Shelstad
USt-Id-Nr.: DE 113078603

Bankverbindungen:
Deutsche Bank AG Limburg BLZ 511 700 10 Konto-Nr. 494 070 800
IBAN: DE 93 5117 0010 0494 0708 00 • BIC/SWIFT-Code: DEUTDEFF511
Commerzbank AG Limburg BLZ 511 400 26 Konto-Nr. 372 945 000
IBAN: DE 18 5114 0026 0372 9450 00 • BIC/SWIFT-Code: COBADEFF511
Volksbank Lahn-Limburg BLZ 511 900 18 Konto-Nr. 32 350 615
IBAN: DE 10 5115 1800 0032 3506 15 • BIC/SWIFT-Code: HELADEF1LIM

MOBA
MOBILE AUTOMATION

CE KONFORMITÄTSERKLÄRUNG

entsprechend ISO/IEC Guide 22 und EN 45014

Name des Herstellers: MOBA Mobile Automation AG

Anschrift des Herstellers: MOBA Mobile Automation AG
Kapellenstraße 15
D-65555 Limburg (Germany)

erklärt, dass das Produkt:

Produktname: **Digi-Slope-Sensor,CAN,LSTA**
04-21-21010

den folgenden Produktspezifikationen entspricht:

EMV (EMU): EN13309:2000 / Schmalband, Breitband Störaussendung

EN61000-4-2 (2001)

EN61000-4-3 (2003)

EN61000-4-4 (2002)

EN61000-4-6 (2001)

ISO 7637-2 (Impulse 1, 2)

ISO 7637-2 ISO Puls 5

Das Produkt entspricht den Anforderungen der EMV- Verordnung 89/336/EWG.
Es wurde in einer typischen Konfiguration getestet.

Limburg, den 19. April 2007

i.V. Matthias Weber
Leiter Qualitätsmanagement

Briefanschrift:
MOBA Mobile Automation AG
Kapellenstraße 15
65555 Limburg
Germany
Telefon +49 6431 9574-0
Fax +49 6431 9574-74

Sitz der Gesellschaft: Limburg
Registergericht: Limburg HRB 2562
Vorsitzender des Aufsichtsrates: Paul G. Harms
Vorstand: Volker G. Harms, W. Bastian
USt-IdNr.: DE 113563988

Bankverbindungen:
Deutsche Bank AG, Limburg BLZ 511 700 18 Konto-Nr. 494 070 600
IBAN: DE 63 5117 0018 0494 0706 00 · BIC/SWIFT-Code: DEUTDEFF511
Sparkasse Limburg BLZ 511 500 18 Konto-Nr. 577 949 600
IBAN: DE 18 5115 0018 0577 9496 00 · BIC/SWIFT-Code: COBADEFF511
Volksbank Limburg BLZ 511 900 18 Konto-Nr. 60 360 610
IBAN: DE 16 5119 0018 0060 3606 10 · BIC/SWIFT-Code: HELADEF1LIM

MOBA
MOBILE AUTOMATION

KONFORMITÄTSERKLÄRUNG
CE
Declaration of Conformity
Declaration de Conformité

This corresponds to EN ISO/IEC 17050-1

Wir / We / Nous

MOBA Mobile Automation AG
Kapellenstraße 15
D-65555 Limburg (Germany)

erklären in alleiniger Verantwortung, dass das Produkt
declare under our sole responsibility that the product
déclarons sous notre seule responsabilité que le produit

Seilzugsensor IV, KL, MCD-090, CAN
04-21-30070

auf das sich diese Erklärung bezieht, mit den folgenden Normen übereinstimmt
to which this declaration relates is in conformity with the following standards
auquel se réfère cette déclaration est conforme aux normes

EN 13309 (2000)

verified standards

EN55022, Class B 1998 + A2:2003

EN61000-4-2 (2001)

EN61000-4-3 (2003)

EN61000-4-4 (2002)

EN61000-4-5 (2001)

ISO 7637-2 (Puls 1, 2)

ISO 7637-2 ISO Puls 5

gemäß den Bestimmungen der Richtlinie
following the provisions of Directive
conformément aux dispositions de Directive

Electromagnetic compatibility 2004/108/EC

Limburg, den 04.08.2010

i.V. Matthias Weber
Leiter Qualitätsmanagement

Hausanschrift:
MOBA Mobile Automation AG
Kapellenstraße 15
65555 Limburg
Germany
Telefon: 49 6431 9577-0
Fax: +49 6431 9577-77

Sitz der Gesellschaft: Limburg
Registergericht: Limburg, HRB 7547
Vorsitzender des Aufsichtsrates: Bernd Reul
Vorstand: Volker G. Hanna, Dr. Dieter Bertel, Arpad Horn, Erwin Scheiber
USt IdNr.: DE 113776 908

Bankverbindungen:
Deutsche Bank AG, Limburg BLZ 511 700 10 Konto-Nr. 494 070 600
IBAN: DE82 5117 0010 0494 0706 00 • BIC (SWIFT-Code): DEUTDEFF511
Commerzbank AG, Limburg BLZ 511 400 09 Konto-Nr. 377 349 800
IBAN: DE16 5114 0009 0377 3498 00 • BIC (SWIFT-Code): COBADEFF511
Kreissparkasse Limburg BLZ 511 520 18 Konto-Nr. 50 350 516
IBAN: DE21 5115 2018 0050 3505 16 • BIC (SWIFT-Code): HELADEF1LIM

MOBA
MOBILE AUTOMATION

CE KONFORMITÄTSERKLÄRUNG

entsprechend ISO/IEC Guide 22 und EN 45014

Name des Herstellers: MOBA Mobile Automation AG

Anschrift des Herstellers: MOBA Mobile Automation AG
Kapellenstraße 15
D-65555 Limburg (Germany)

erklärt, dass das Produkt:

Produktname: **Digi-Rotary-Sensor, (CAN)**
04-21-40110

den folgenden Produktspezifikationen entspricht:

EMV (EMC): EN13309:2000 / Schmalband, Breitband Störaussendung

EN61000-4-2 (2001)

EN61000-4-3 (2003)

EN61000-4-4 (2002)

EN61000-4-6 (2001)

ISO 7637-2 (Impulse 1, 2)

ISO 7637-2 ISO Puls 5

Das Produkt entspricht den Anforderungen der EMV- Verordnung 89/336/EWG.
Es wurde in einer typischen Konfiguration getestet.

Limburg, den 05. Februar 2007

i.V. Matthias Weber
Leiter Qualitätsmanagement

Hausanschrift:
MOBA Automation AG
Kapellenstraße 15
65555 Limburg
Germany
Telefon: +49-6431 9577-0
Fax: +49-6431 9577-177

Sitz der Gesellschaft: Limburg
Handelsregister: Amtsgericht Limburg, HRB 4262
Vorstandsvorsitzender: Aufsichtsrat: Prof. Dr. Hanns-Werner Kirchhoff
Vorstand: Markus O. Hahn, Wilfried Sehr

Bankverbindungen:
Commerzbank AG Limburg BLZ 511 400 25 Konto-Nr. 3773458000
Commerzbank AG Diez BLZ 510 400 10 Konto-Nr. 1035547
Kreissparkasse Limburg BLZ 511 502 15 Konto-Nr. 3850615
Dresdner Bank AG Limburg BLZ 510 800 30 Konto-Nr. 770526100
Deutsche Bank AG Limburg BLZ 511 700 18 Konto-Nr. 4940780
Postbank Frankfurt/Main BLZ 500 100 60 Konto-Nr. 5656460

MOBA
MOBILE AUTOMATION

KONFORMITÄTSERKLÄRUNG
CE Declaration of Conformity
Declaration de Conformité

This corresponds to EN ISO/IEC 17050-1

Wir / We / Nous

MOBA Mobile Automation AG
Kapellenstraße 15
D-65555 Limburg (Germany)

erklären in alleiniger Verantwortung, dass das Produkt
declare under our sole responsibility that the product
déclarons sous notre seule responsabilité que le produit

Laserempfänger LS-3000
04-60-11310

auf das sich diese Erklärung bezieht, mit den folgenden Normen übereinstimmt:
to which this declaration relates is in conformity with the following standards
auquel se réfère cette déclaration est conforme aux normes

EN 13309 (2000)

verified standards

EN55022, Class B 1998 + A2:2003

EN61000-4-2 (2001)

EN61000-4-3 (2003)

EN61000-4-4 (2002)

EN61000-4-6 (2001)

ISO 7637-2 (Puls 1, 2)

ISO 7637-2 ISO Puls 3

gemäß den Bestimmungen der Richtlinie
following the provisions of Directive
conformément aux dispositions de Directive

Electromagnetic compatibility 2004/108/EC

Limburg, den 21.11.2008

i.V. Matthias Weber
Leiter Qualitätsmanagement

Hausanschrift
MOBA Mobile Automation AG
Kapellenstraße 15
65555 Limburg
Germany
Telefon +49 6431 9577-0
Fax +49 6431 9577-177

Sitz der Gesellschaft: Limburg
Registergericht: Limburg HRB 2552
Vorsitzender des Aufsichtsrats: Harald Rohl
Vorstand: Volker G. Hiemer, Dr. Holger Bachus, Alfred Herz, Thomas Strobel
USt-Idnr. DE 113026508

Bankverbindungen:
Deutsche Bank AG Limburg BLZ 511 700 10 Konto-Nr. 494 075 800
IBAN: DE 25 5117 0010 0494 0758 00 • BIC/SWIFT-Code: DEUTDEFF511
Commerzbank AG Limburg BLZ 511 400 20 Konto-Nr. 377 945 500
IBAN: DE 19 5114 0020 0377 9455 00 • BIC/SWIFT-Code: COBADEFF511
Kreissparkasse Limburg BLZ 511 502 15 Konto-Nr. 20 500 670
IBAN: DE 10 5115 0015 0020 5006 70 • BIC/SWIFT-Code: HELADEF1LIM

MOBA
MOBILE AUTOMATION

KONFORMITÄTSERKLÄRUNG
Declaration of Conformity
Declaration de Conformité

This corresponds to EN ISO/IEC 17050-1

Wir / We / Nous

MOBA Mobile Automation AG
Kapellenstraße 15
D-65555 Limburg (Germany)

erklären in alleiniger Verantwortung, dass das Produkt
declare under our sole responsibility that the product
déclarons sous notre seule responsabilité que le produit

Laserempfänger CLS-3000
04-60-11320

auf das sich diese Erklärung bezieht, mit der folgenden Normen übereinstimmt
to which this declaration relates is in conformity with the following standards
auquel se réfère cette déclaration est conforme aux normes

EN 13309 (2000)

verified standards

EN55022, Class B 1998 + A2:2003

EN61000-4-2 (2001)

EN61000-4-3 (2003)

EN61000-4-4 (2002)

EN61000-4-6 (2001)

ISO 7637-2 (Puls 1, 2)

ISO 7637-2 ISO Puls 5

gemäß den Bestimmungen der Richtlinie
following the provisions of Directive
conformément aux dispositions de Directive

Electromagnetic compatibility 2004/108/EC

Limburg, den 28.05.2010

i.V. Matthias Weber
Leiter Qualitätsmanagement

Hausanschrift:
MOBA Mobile Automation AG
Kapellenstraße 15
65555 Limburg
Deutschland
Telefon +49 6431 59740
Fax +49 6431 59741

Sitz der Gesellschaft: Limburg
Registergericht: Limburg HRB 2652
Vorstandsmitglieder: Volker Kamm, Dr. Ingo Seifert,
Aufsichtsrat: Josef Rinkhof
USt-IdNr.: DE 113028555

Bankverbindungen:
Deutsche Bank AG, Limburg BLZ 511 700 18 Konto-Nr. 454 370 800
IBAN: DE 30 5117 0018 0454 3708 00 · BIC/SWIFT-Code: DEUTDE5F511
Commerzbank AG Limburg BLZ 511 400 59 Konto-Nr. 577 348 800
IBAN: DE 55 5114 0059 0577 3480 00 · BIC/SWIFT-Code: COBADEFF511
Kreissparkasse Limburg BLZ 511 500 15 Konto-Nr. 80 650 015
IBAN: DE 66 5115 0015 0080 6500 15 · BIC/SWIFT-Code: HELADEF1LIM

13 Definition of terms / Glossary

Term	Definition
Working point	Point (distance or slope) at which the actual and the set point are alike and no control takes place.
CAN bus	The CAN bus (**C**ontrolled **A**rea **N**etwork) is a system for serial data transfer. It has been developed to connect control devices in automobiles to reduce the cable looms (up to 2 km per car) and make the data transfer safer.
Actual value	The up-to-date value measured by a sensor, e.g. the distance of a distance sensor to the reference or the slope measured by a slope sensor.
Min-pulse	Minimum actuating pulse necessary to move a hydraulic sensor in the smallest range possible.
Max-pulse	Actuating pulse which defines the hydraulic cylinder's maximum permissible working speed.
Zero adjustment	The value "0.0" is assigned to the up-to-date measured value and at the same time is adopted as set point for the control.
Offset	A constant systematic error in a variable or a measured value (e.g. a displacement in case the Digi-Slope Sensor cannot be mounted absolutely parallel to the tool's bottom edge).
Proportional band	Area above or below the dead band where a "dosed" output actuation takes place. The pulse length depends on the control deviation.
Control deviation	Difference between target and actual value. During controlling the controller moves the actuating element in a way that the sensor's measured value (actual value) is consistent with the default value (set point).
Set point, set value	The target value, set and preset respectively by the operator, which shall be achieved and kept by the control loop.

Actuating element	Transfers a control's signals (mostly) into mechanical work – i.e. movement – e.g. an opening or closing valve.
Dead band	Symmetrical area around the working point in which no actuation takes place. It serves to achieve stable tool behaviour at the working point.

Notes:

Notes:

Notes: